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A Monthly Journal of Engineering Progress

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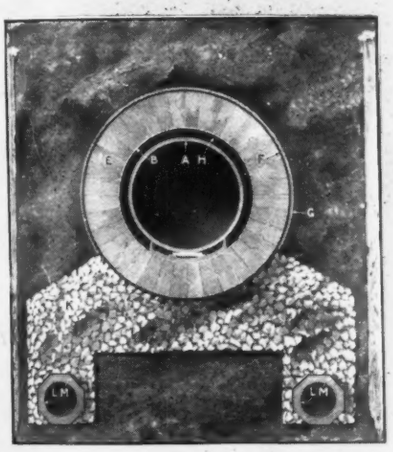

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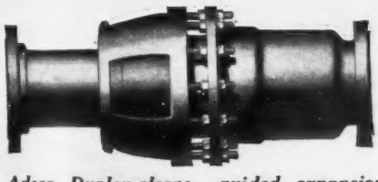

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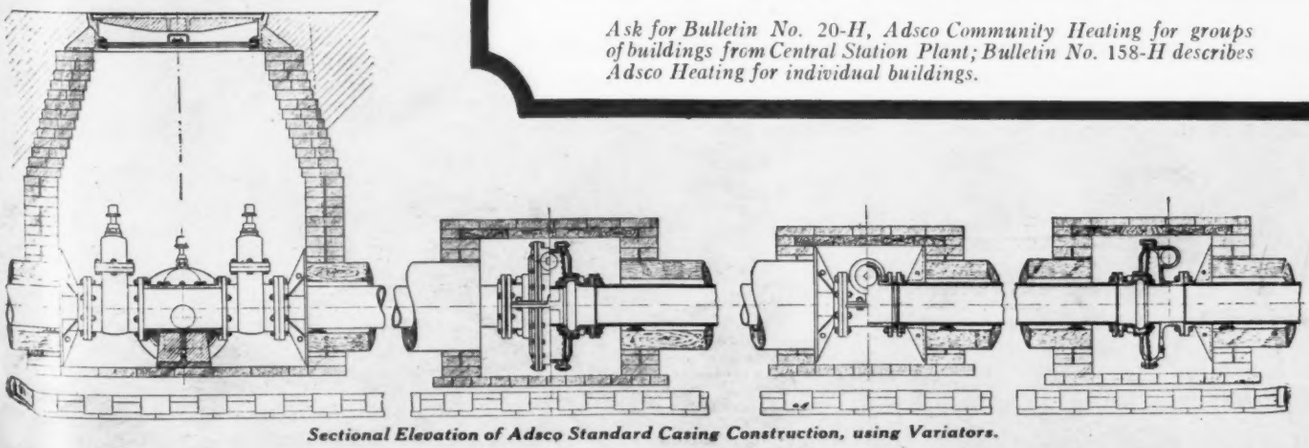

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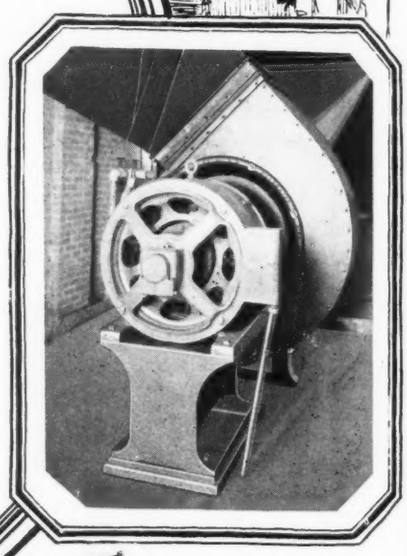

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Vol. XX. No. 6

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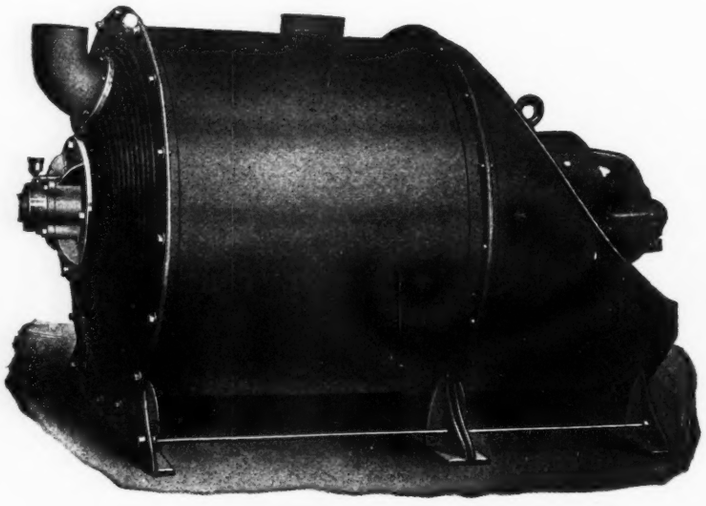
Send for list of references of school installations and complete data regarding the Spencer equipment.

Spencer Turbine

Cleaning Systems



Horizontal slow speed Spencer Turbine vacuum cleaning exhauster. Direct motor driven, wide clearance, multistage type equipment.

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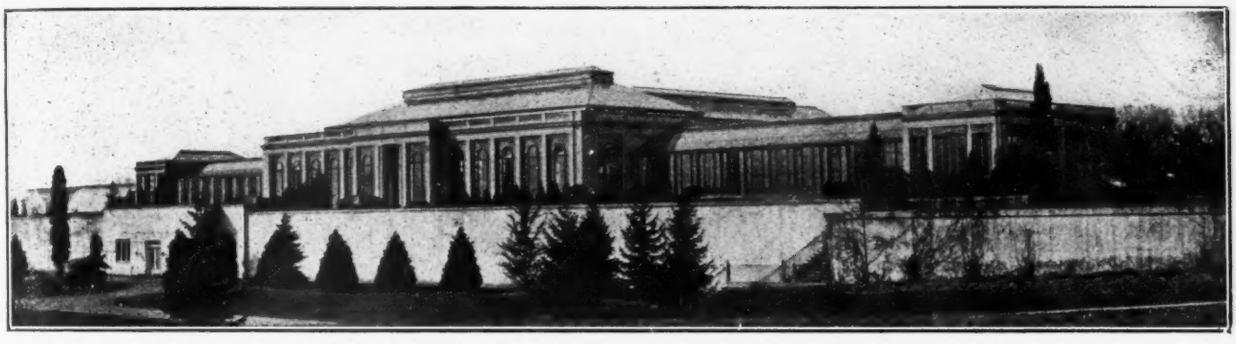


THE DUPONT CONSERVATORY AT LONGWOOD, INC., PA.

Heating, Ventilating and Humidifying One of the World's Largest Private Conservatories

The Unique Methods Followed in the Design of the Equipment for the Dupont Horticultural Buildings at Longwood, Inc.

THE well-known group of horticultural buildings on the Dupont estate at Longwood, Inc., near Kennett Square, is equipped with some very interesting and novel methods of heating which vary from the typical methods applied to the average greenhouse or private conservatory. So far as is known, this is one of the largest horticultural groups undertaken by a private estate and in the development of the engineering features it is believed to be the first application of gravity indirect heating, with complete temperature control, as designed for the Main Building and the Rose House, which will be described in this article.

BOILERS DESIGNED FOR FUEL-OIL.

The heating and ventilating systems, together with the boiler plant, cost approximately $200,000, or about 10% of the cost of the entire group of buildings. The boiler plant is located under the terrace at the rear of the Service Building and is equipped with four 110-H. P. Heine water-tube boilers, set in single battery, 8 ft. 6 in. from floor to header, with furnaces designed for fuel-oil. An interesting feature in connection with the fuel-oil installation, is the construction of a 300,000-gal. reinforced-concrete reservoir located underground and divided into two compartments, each having a capacity of 150,000 gal.; the total being sufficient for approximately fourteen months' supply, allowing for a considerable increase in buildings to the present group.

From the reservoir the underground oil supply line, with heating pipe, is run for a distance of 400 ft. to the service tank in the boiler house. This tank is filled automatically. The oil-burning equipment was furnished by the Hammel Company and includes pumps, heaters, governors and temperature control for heating oil in storage.

BUILDINGS HEATED BY THREE DISTINCT SYSTEMS.

Steam is generated at the boiler plant at approximately 90 lbs. gauge, as all auxiliaries are steam-driven units. Electric-driven units were not used owing to the intermittent electric service which would be detrimental to the life of the valuable plants housed in these buildings. The steam is distributed to the various groups of buildings through reducing valves with remote pilot control, there being three distinct systems. That in the Service Building utilizes excess exhaust steam, together with live steam when necessary. This also serves to heat the water for domestic service and the tempered water for the entire group. The next system of distribution supplies the typical greenhouse buildings

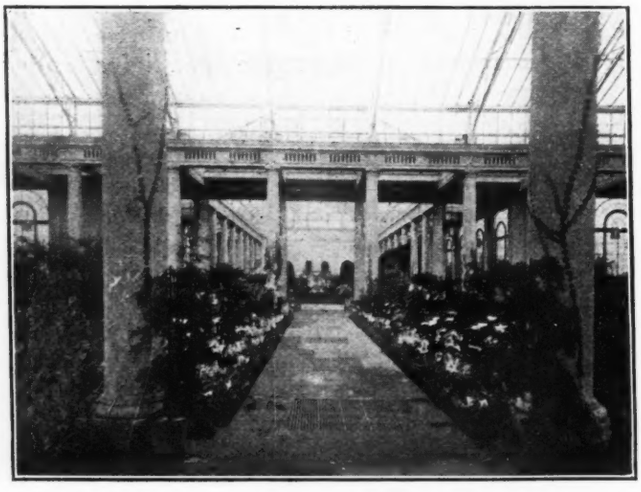
known as the Growing Group, while the third system of distribution consists of an intermediate pressure main run through a system of tunnels to the Main Building where the pressure is again reduced. From this high pressure main a branch was recently run through the main building and underground for a distance of 1200 ft. to supply a garage, residence and vegetable greenhouse, thus eliminating the coal-fired boilers at these points.

ENTRANCE TO CONSERVATORY AT LONGWOOD.

All sections of the group are heated by steam on a vacuum system. In the Service Building, which includes a large work-room, dining room, office and sleeping quarters on the second floor and a large storage space for supplies in the basement, automatic temperature control is supplied to all heated portions of the building, except the bedrooms. Storage space is not heated. This building is approximately 70 ft. x 60 ft., plus the wings, having a floor area of 5200 sq. ft.; the volume of the building is 90,000 cu. ft., with 6600 sq. ft. of wall surface and 2000 sq. ft. of glass. It is supplied with 1550 sq. ft. of direct radiation to maintain an average temperature of 70° F.

Leading from the Service Building is a series of tunnels passing under the entire Growing Group and Main Building. In these tunnels are installed all heating, plumbing and electric distributing mains.

The Growing Group adjoins the Service Building. These houses are of typical greenhouse construction and have a total ground area of 22,000 sq. ft., with approximately 196,000 cu. ft. volume, 4800 sq. ft. brick wall surface, 36,600 sq. ft. glass area. They are equipped with approximately 7900 sq. ft. of direct radiation in the form of pipe coils supported on especially-designed pedestals and racks placed under the benches. The average temperature for this group is 60° F.



INTERIOR OF CONSERVATORY, SHOWING AIR GRILLES IN FLOOR.

The Rose House connected with this group is equipped with an indirect gravity system of heating similar to that applied to the Main Building, which will be described later.

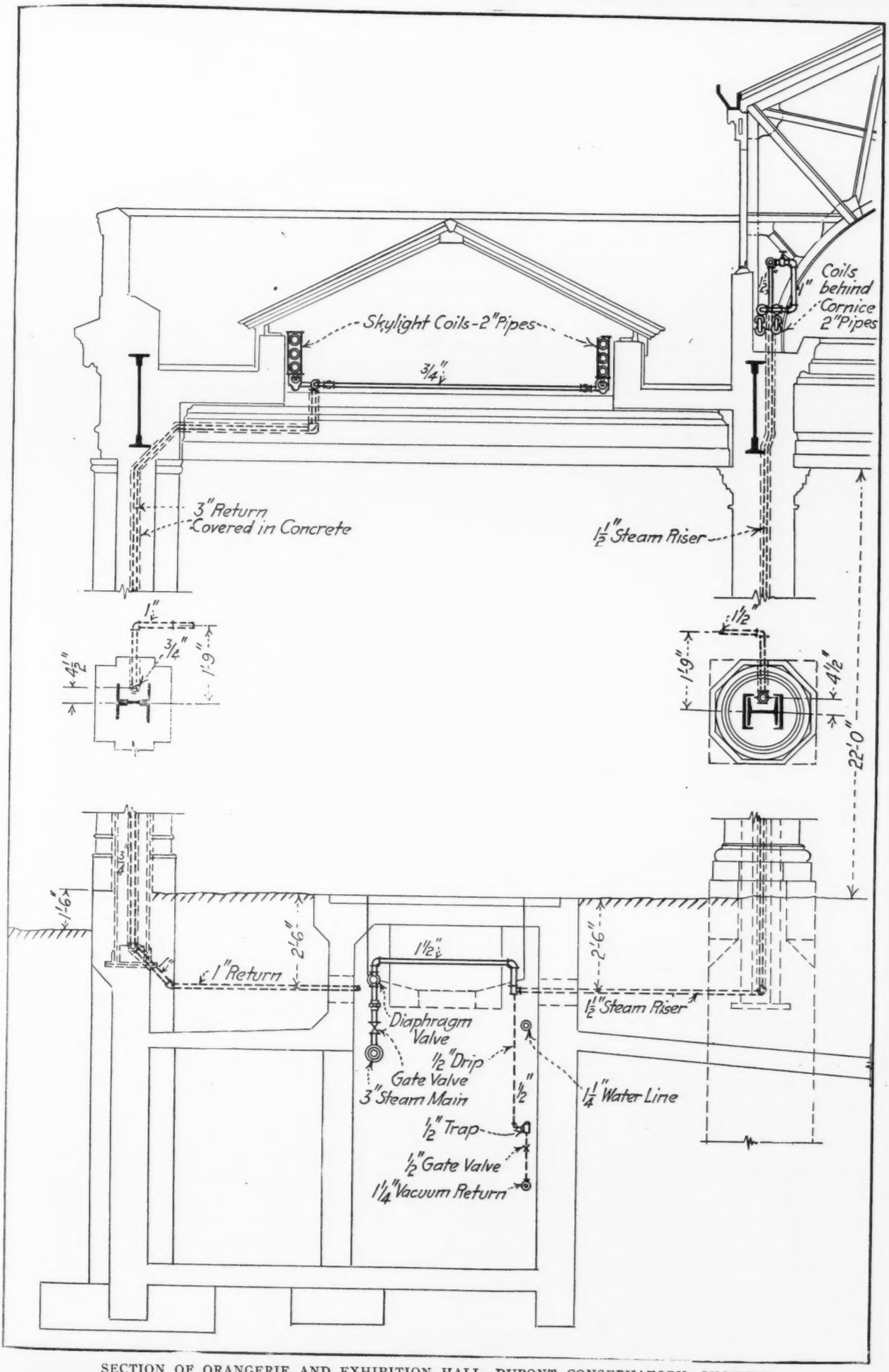
EQUIPMENT OF MAIN BUILDING.

The Main Building is an imposing structure having a steel skeleton framework, with glass roofs and large glass wall area. All steel work is encased in concrete treated with special stone finish. It was particularly desired to eliminate visible direct radiation in this building which includes the orangerie, exhibition hall, peach house and display house, with organ loft and service room at the rear of the exhibition hall. This is accomplished by the application of a gravity indirect system of heating, including fresh-air intakes and primary heaters to secure fresh air in moderate weather. The air is recirculated by means of floor grilles and provision is made to automatically close the fresh-air intake dampers and to open the recirculating grilles.

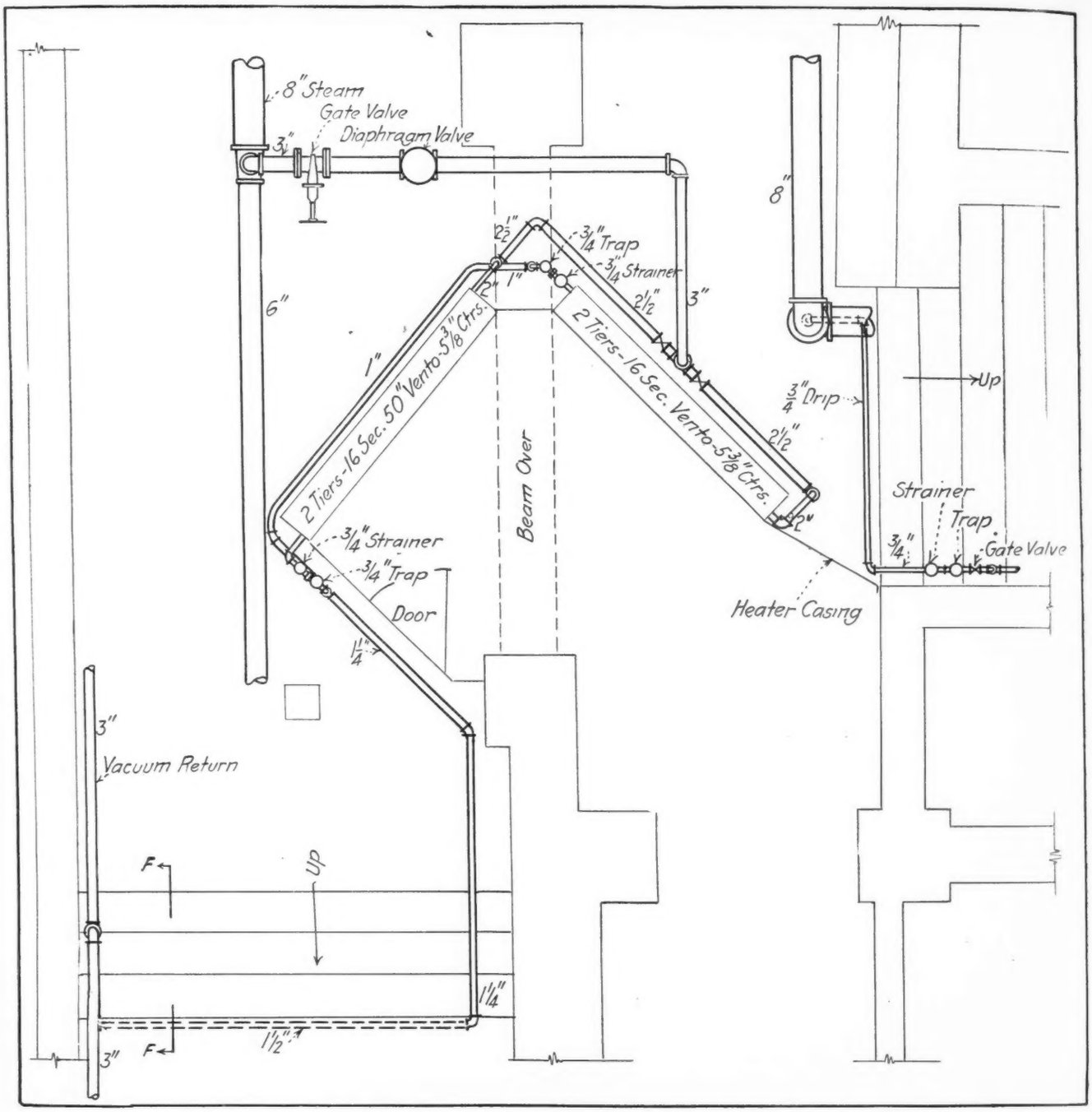
LOCATION OF INDIRECT HEATING STACKS UNDER WALK WAYS.

All the indirect heating stacks are located in a system of tunnels constructed under the walk ways. The heating stacks consist of Vento cast-iron radiation divided into two banks located either side of the floor grilles. All casings for indirect stacks and recirculating grilles are of sheet copper.

The main building has a total floor area of 44,000 sq. ft. with a volume of 1,130,000 cu. ft., 20,000 sq. ft.

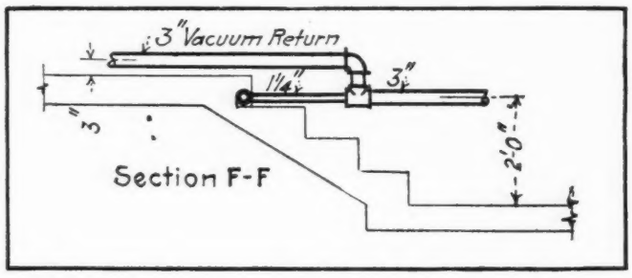


SECTION OF ORANGERIE AND EXHIBITION HALL, DUPONT CONSERVATORY, SHOWING ARRANGEMENT OF PIPING FOR SKYLIGHT COILS AND BELOW FLOOR.



TYPICAL PRIMARY HEATER CONNECTIONS, DUPONT CONSERVATORY.

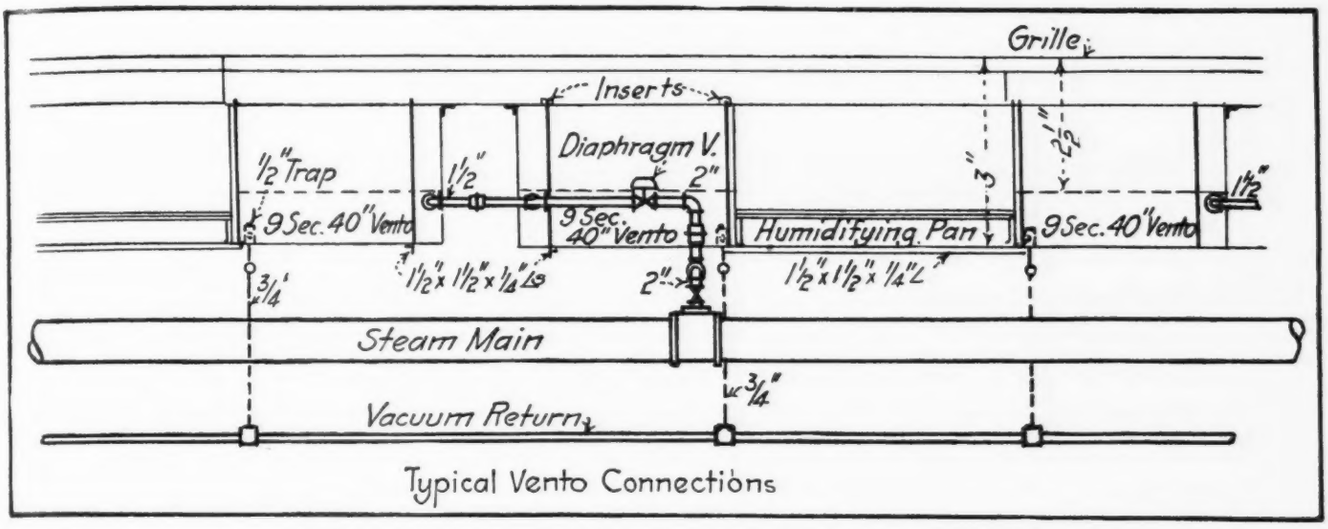
of wall surface, and 64,000 ft. of glass surface. It is equipped with 12,000 sq. ft. of radiation in tunnels, 3400 sq. ft. of primary heaters at fresh-air intakes and 8500 sq. ft. of concealed pipe-coil radiation located in the cornice and around the sky lights over the walk ways. The system was designed to maintain an average temperature of 65° F. in zero weather. This system of heating was also applied to the Rose House, as previously stated.



SECTION F-F OF TYPICAL PRIMARY HEATER CONNECTIONS.

ARRANGEMENT OF AUTOMATIC TEMPERATURE CONTROL.

Owing to the difficulty of securing proper hand control for radiation located in the tunnels, a complete system of automatic temperature control was installed. The thermostats were especially designed and consist of calibrated stem thermostats with the working parts mounted in cast-bronze boxes with water-proof covers, the thermostat stems being protected with an asbestos-lined copper hood to prevent action of sun effect. The thermostats are of two-point control, so arranged that one-half of the radiation would come into effect as the temperature falls to the room temperature desired. Should this amount of radiation not be sufficient, the



TYPICAL VENTO CONNECTIONS, DUPONT CONSERVATORY BUILDINGS.

second point comes into effect and brings the second half of the radiation into service. The second units are equipped with intermediate-acting valves. All coils in the skylight, and concealed behind the cornice, are operated by thermostat control with diaphragm valves placed in tunnels.

HUMIDIFYING PANS EQUIPPED WITH COPPER COILS SUBMERGED IN WATER.

In connection with the heating system it was found desirable to provide a system of humidifying pans consisting of copper coils submerged in water. Steam is admitted to the coils by group control through a diaphragm valve operated by means of a room humidostat. This system is applied only to the orangerie, exhibition hall and organ loft sections of the main building. The humidifying system consists of 39 units with a capacity of humidifying 23,000 cu. ft. of air per minute, at 65° F., to 70% relative humidity.

CONTROL OF SKYLIGHT VENTILATORS.

In order to supplement the ventilation in the orangerie and exhibition halls, the ventilators in the skylight are operated by motor-driven units with remote control from a central push-button station, there being a total of 22 units. The sash can thus be quickly closed in an emergency.

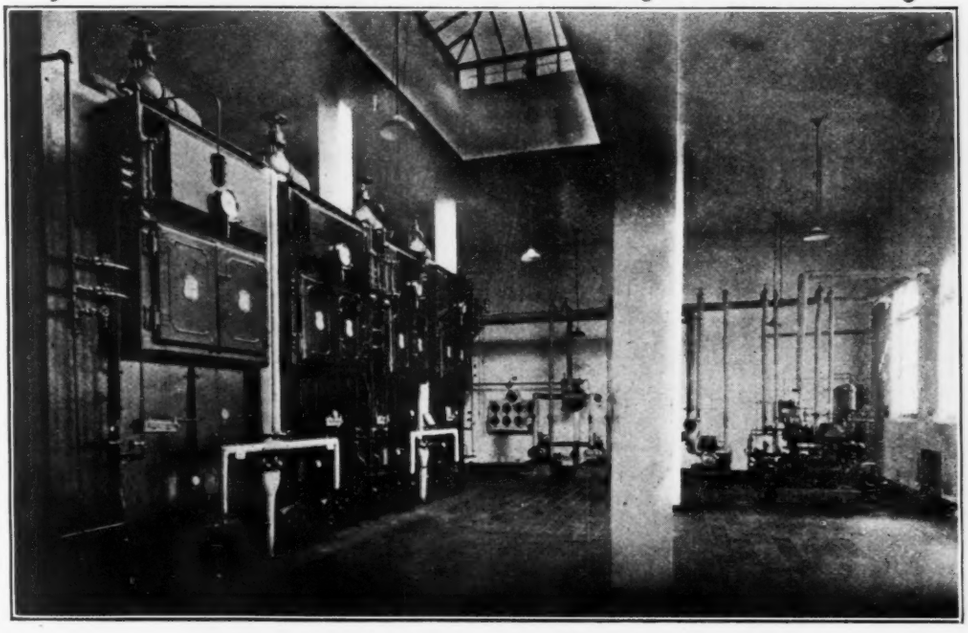
In front of the main building, under the terrace, is a reception suite which is heated by a fan-blast split-duct system, with automatic temperature control and by-pass dampers. The system is equipped with a motor-driven blower having a capacity of 3,600 ft. per minute and with two propeller-type exhaust fans, each of 1,600 cu. ft. capacity.

The entire group of buildings contain approximately 18,000 sq. ft. of direct radiation, 12,000 sq. ft. of gravity indirect radiation, and 3400 sq. ft. of primary coils at fresh-air intakes, or an equivalent of about 40,000 sq. ft. of direct radiation in the present buildings. The vacuum pumps, together with the feed pumps, fuel-oil pumps and air pressures for the temperature-control systems deliver exhaust steam into the feed-water heater, and all excess exhaust passes to the heating system of the Service Building.

A separate low-pressure steam-driven pump (vacuum) is located at the rear of the main building. This delivers the returns into the air-separating tank and the condensation returns to the feed-water heater.

An interesting feature in connection with this work is the installation of a tempered-water tank having a capacity of heating 5,000 gal. of water per hour from 35° to 65°. It is used during the winter season when the water received from the supply system would be too cold for use in connection with plant life; the cold water being heated to 60° or 65°.

The heating and ventilating equipment for the entire group was designed by Robert P. Schoenijahn of Wilmington, Del.



BOILER AND PUMP ROOM, DUPONT CONSERVATORY.

Short Cuts in Estimating the Weights of Sheet Metal Ducts

New Charts for Figuring Both Rectangular and Round Construction, Covering a Wide Range of Sizes

By Fred L. Moesel

of Meyer, Strong & Jones, Inc., Consulting Engineers, New York.

THE accompanying charts have been drawn to facilitate estimating the weights of sheet-metal ducts. Starting with the necessary information, the dimensions of the ducts, gauges of the metal and lengths of the run, the total weight of the ducts can be obtained.

Chart No. 1, which is the main chart, covers all ducts from 3 in. x 6 in. up to 206 in. x 80 in., with the gauge curves crossing the perimeters for which they are generally specified, allowing range for using several gauges on most sizes. The chart covers the range from the smallest work up to the office building where the writer has used ducts as wide as 180 in. to 190 in.

As this chart, on account of its large range, was made on a small scale, it was considered advisable to divide the chart into three parts. In this way a larger scale is provided on the same size sheet, thereby reducing the existing drafting errors and variable reading errors. Dividing the large range made it possible to include some of the gauges on perimeters they could not cover on the large sheet.

Chart No. 2 covers all sizes from 3 in. x 6 in. up to 27 in. to 73 in.

Chart No. 3 covers sizes from 6 in. x 60 in. up to 53 in. x 133 in.

Chart No. 4 has a range from 10 in. x 120 in. up to 47 in. to 205 in.

Chart No. 5 covers round ducts from 6-in. diameter up to 100-in. diameter. The same weights were used in plotting this chart, except for the No. 10 black U. S. standard gauge, a line for which has been included to cover stacks.

The National Association of Galvanized Sheet-Iron Manufacturers' weights were used on these charts.

Gauge No.	Ounces per Square Foot.	Pounds per Square Foot
16	42.5	2.66
18	34.5	2.16
20	26.5	1.66
22	22.5	1.41
24	18.5	1.16
25	16.5	1.03
26	14.5	0.91
28	12.5	0.78

No allowance has been made on the charts for rivets, lapping or trimming, but these can be added by plotting another set of curves across the chart, as will be described later.

ALLOWANCES FOR RIVETS, LAPPING AND TRIMMING.

A good method of making the allowance is to take the average additions in per cent. Assuming 10%, for instance, on a small duct of about No. 28 gauge, an increase of 10% in the weight per square foot would make it 0.078 lbs. plus 0.0078 lbs., or approximately 0.086 lbs. per square foot. To plot the curve for this addition multiply the index of each perimeter line by 0.086, mark these points and draw a smooth curve through them. As the larger duct sizes are reached, the allowance will become greater due to the additional laps, and the curves will not rise as rapidly as without the allowance.

HOW THE CHARTS WERE DEVELOPED.

Since the total weight of a duct depends on the total number of square feet of surface in the duct, to find this it is necessary to calculate the surface in a section of the duct 1 ft. long and multiply this by the length of the duct.

For example, in a duct 58 in. x 20 in., the number of square feet of surface would be the perimeter, or 2 x 58 in., plus 2 x 20 in. = 156 in. Dividing by 12, we get a 13-ft. perimeter. On the charts this operation is done on the lower half which is an addition chart. Locate 58 in. on the lower scale of the large chart. Pass vertically up to the line which is marked 20 in., on the left end. There we find a diagonal passing through the intersection which is the 13-ft. perimeter line.

The surface of duct in 1 ft. length being equal to the perimeter in feet multiplied by 1, the lines on the chart marked, "Perimeter of Duct" could not be "Square Feet of Surface per Lineal Foot of Duct."

Taking the square feet of surface per lineal foot of duct and multiplying by the weight per square foot will give us the weight per lineal foot of duct. The gauge curves on the chart have been plotted so that from the intersection of the perimeter (or square feet per lineal foot of duct) lines with the gauge curves, an imaginary line passing vertically up to the upper half of the chart will give the weight per foot length of duct. Following up this line to the desired "length of duct" line, the diagonal passing through this point will give the total weight of the duct. The following examples will illustrate these points:

TYPICAL EXAMPLES.

Example 1: Find the weight of a duct 133 in. x 12 in., No. 22 gauge, 63 ft. long.

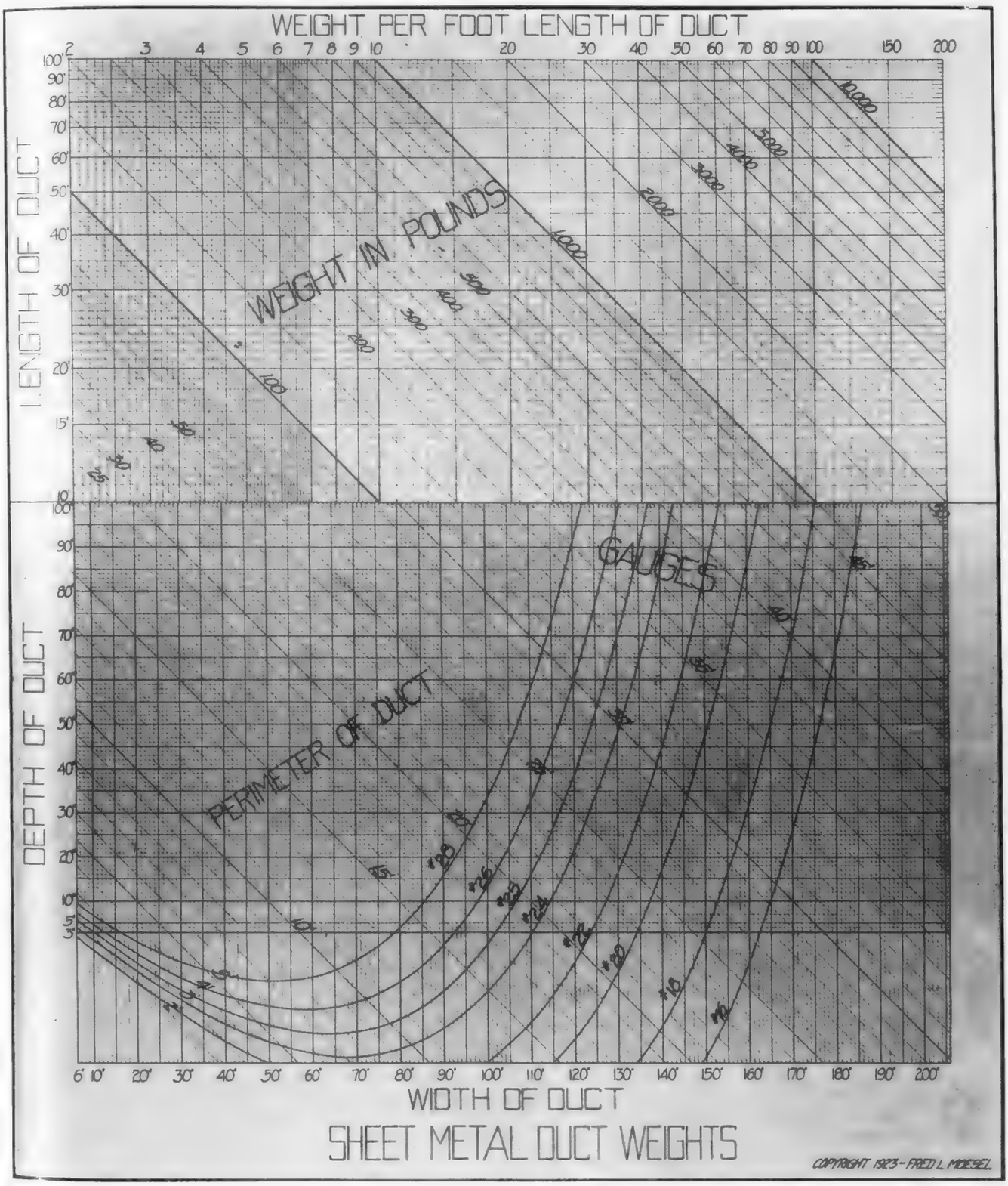


CHART 1—CHART FOR DETERMINING WEIGHTS OF SHEET-METAL DUCTS FROM 3 IN. X 6 IN. UP TO 80 IN. X 206 IN.

Solution: On the bottom scale of the chart, at the point marked 133 in., move up the line to the 12-in. depth line. The diagonal at this point is 24 ft. 2 in. The space between 24 ft. perimeter and 25 ft. perimeter is divided into six parts, making each division 2 in. Moving down the 24 ft. 2 in. perimeter diagonal to the No. 22 gauge curve and projecting to the upper half of the chart, will indicate the weight of 34.20 lbs. per foot length of duct. Following up to the 63-ft. length of duct line, the intersection occurs between the 2100 and 2200-lb. diagonals and would be estimated as 2150 lbs.

By actual calculation, $2 \times 133 + 2 \times 12 = \frac{290}{12}$ = 24 ft. 2 in. perimeter. 24 ft. 2 in. perimeter $\times$ 1 ft. length of duct = 24.166 sq. ft. of surface. The weight of No. 22 gauge being 1.41 lbs. per square foot, then $24.166 \times 1.41 = 34.076$ lbs. per foot length of duct.

Since the reading from the chart was 34.2 lbs. per foot length of duct, there is obviously an error, the per cent. of which can be found by $\frac{34.074}{34.2} = 0.9963$, which means that the error in the reading was 0.37% too high. At 34.074 lbs. per foot length of duct, for 63 ft. we have $34.074 \times 63 = 2147$ lbs.

Example 2: On Chart No. 1 find the weight of a duct 130 in. $\times$ 56 in., No. 20 gauge, and 46 ft. long.

Solution: At 130 in., on the bottom scale pass up vertically to the 56-in. depth line. The diagonal passing through this point is 31 ft. Move down this diagonal to the No. 20 gauge curve. Then projecting up we find the duct weighs approximately 52 lbs. per foot of length. Passing up to the 46-ft. length of duct will bring the intersection betwen 2300 and 2400, or approximately 2340. Figuring the problem will show that the 2340 lbs. is about 2% too low.

HOW TO PROCEED WHEN CLOSER READINGS ARE DESIRED

To get a closer reading, let us take the same problem on Chart No. 4. Reading up from 130 in. on the bottom scale to the intersection with the 56-in. depth line, we find, as before, the 31-ft. diagonal. Passing down this line to the No. 20 gauge curve and the projecting up, we find the duct weighs 51.6 lbs. per foot of length. Following up to the 46-ft. run of duct line, the intersection is at approximately 2170 lbs.

To read Chart No. 5, the diameter of duct is located on the bottom scale on the left side of the chart. Passing up to the gauge line, the weight per lineal foot is found on the scale at the left side. Then

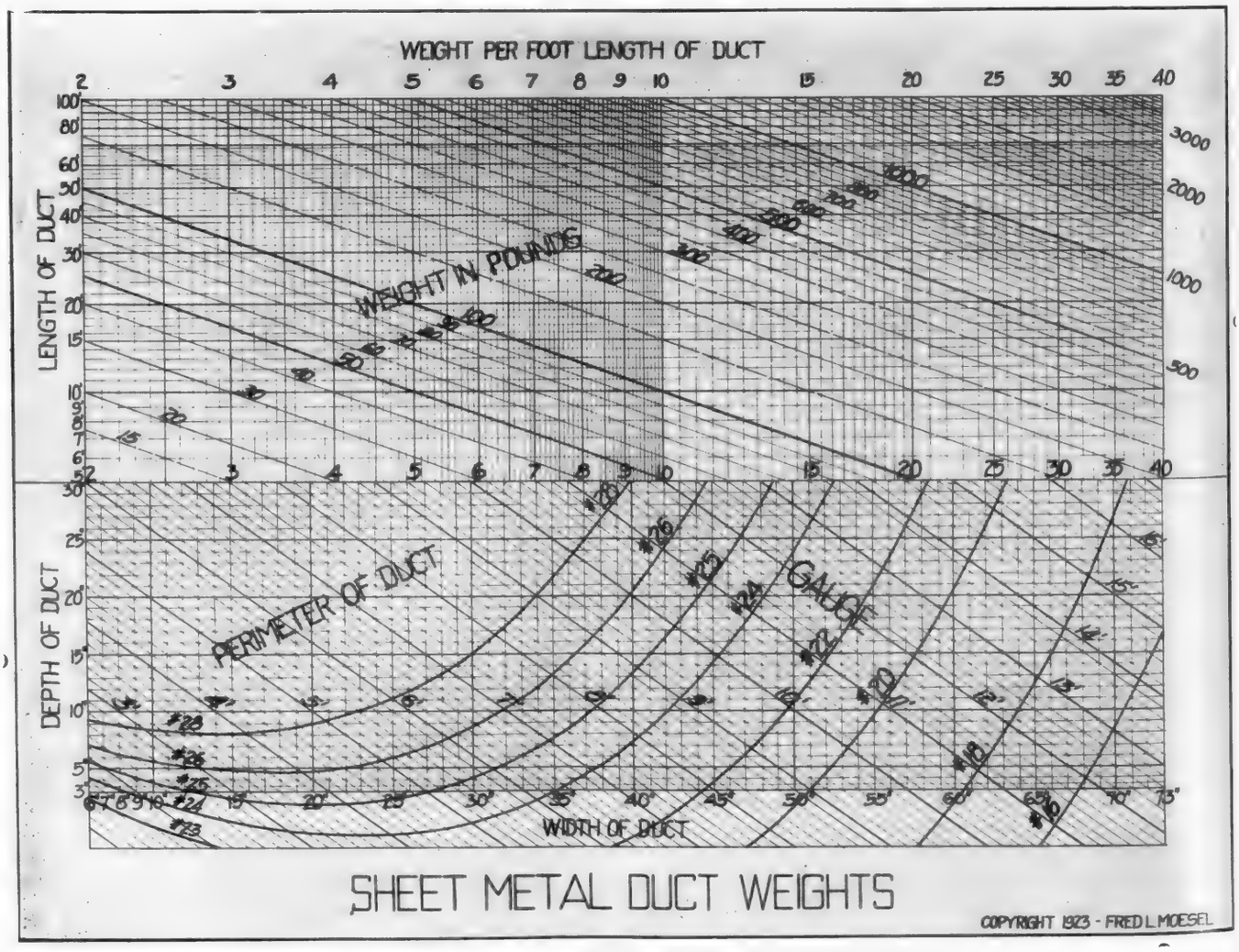


CHART 2—FOR DUCTS FROM 3 IN. X 6 IN. UP TO 27 IN. X 73 IN.

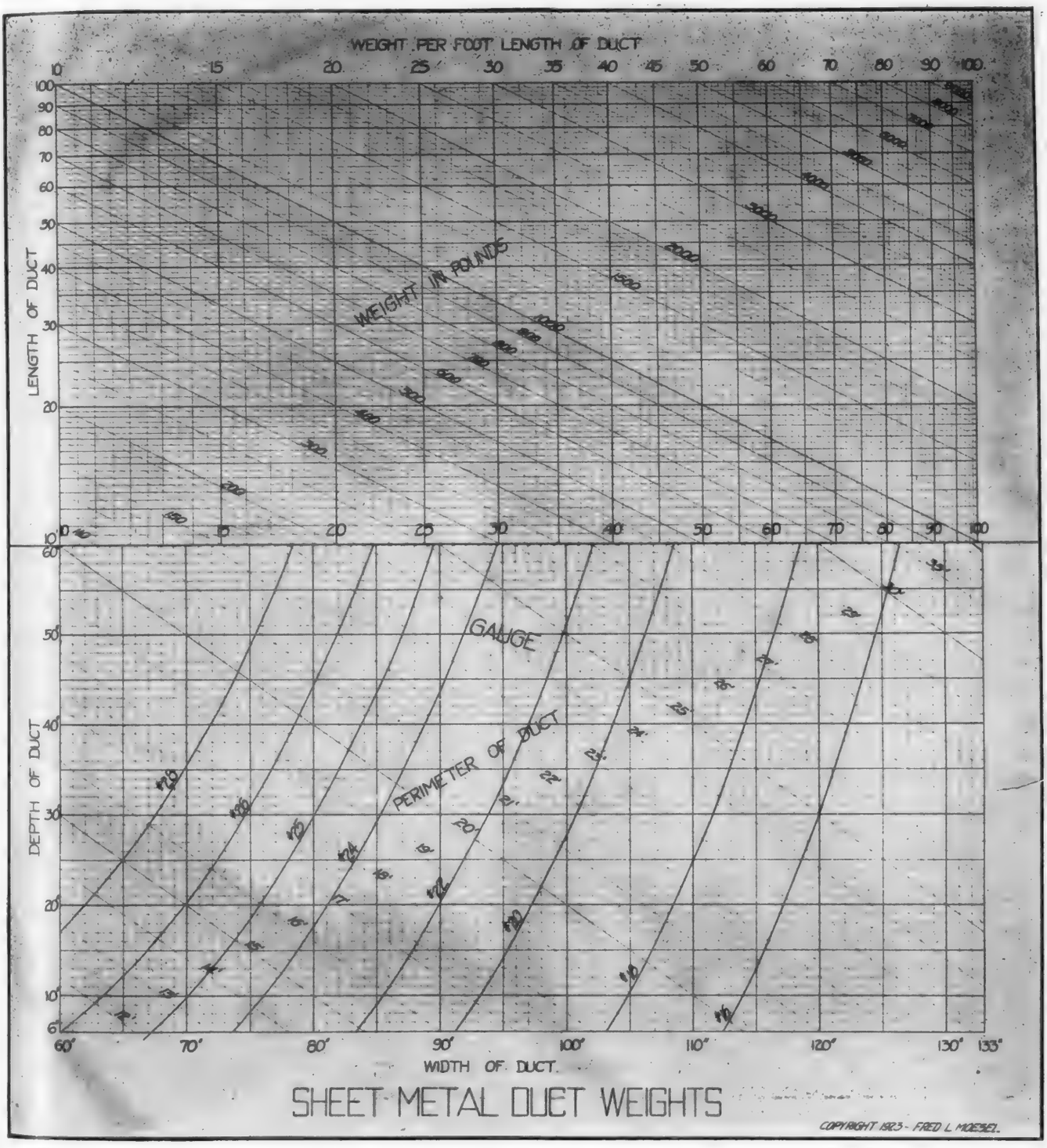


CHART 3—FOR DUCTS FROM 6 IN. X 60 IN. UP TO 53 IN. X 133 IN.

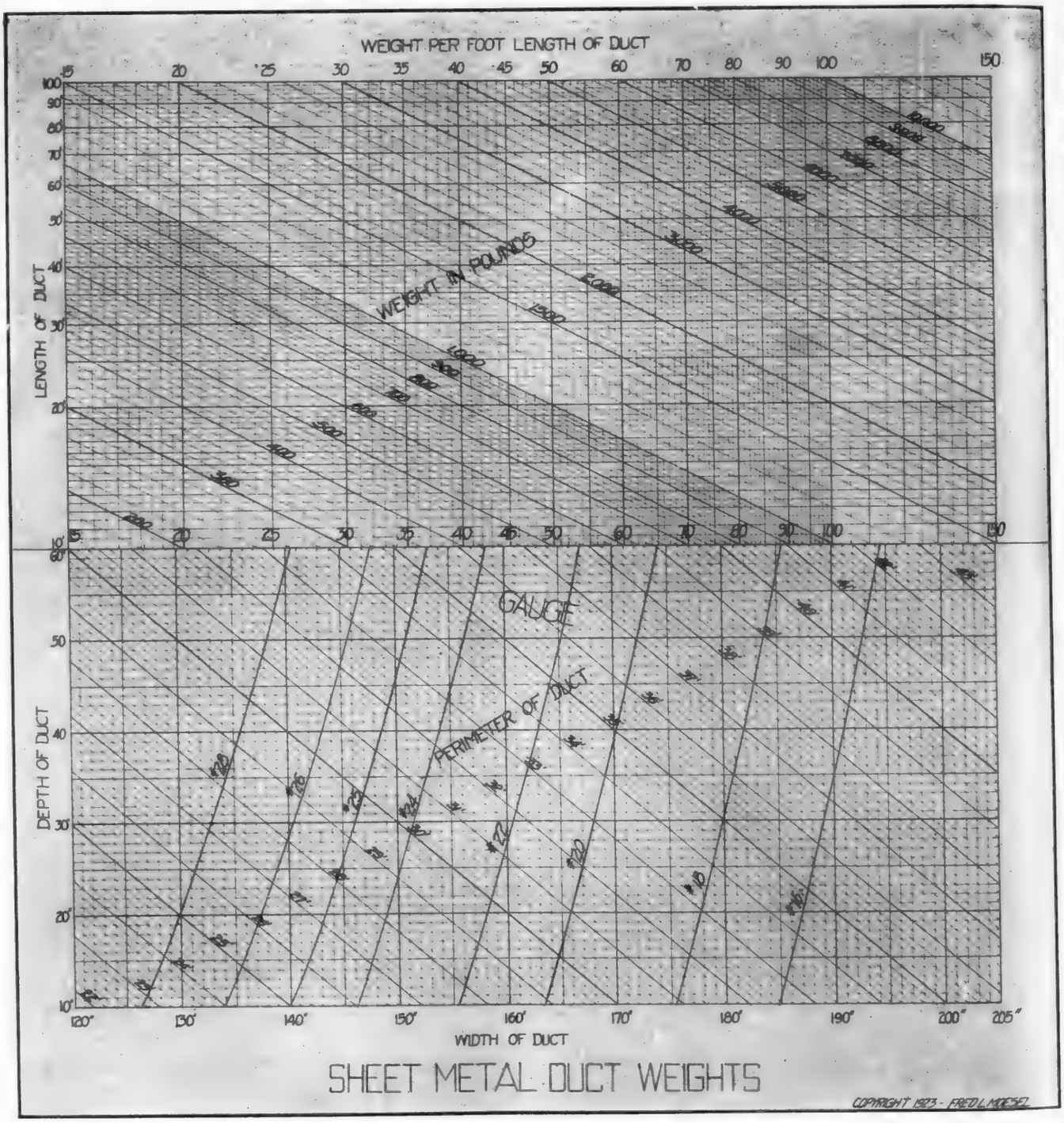


CHART 4—FOR DUCTS FROM 10 IN. X 120 IN. UP TO 47 IN. X 205 IN.

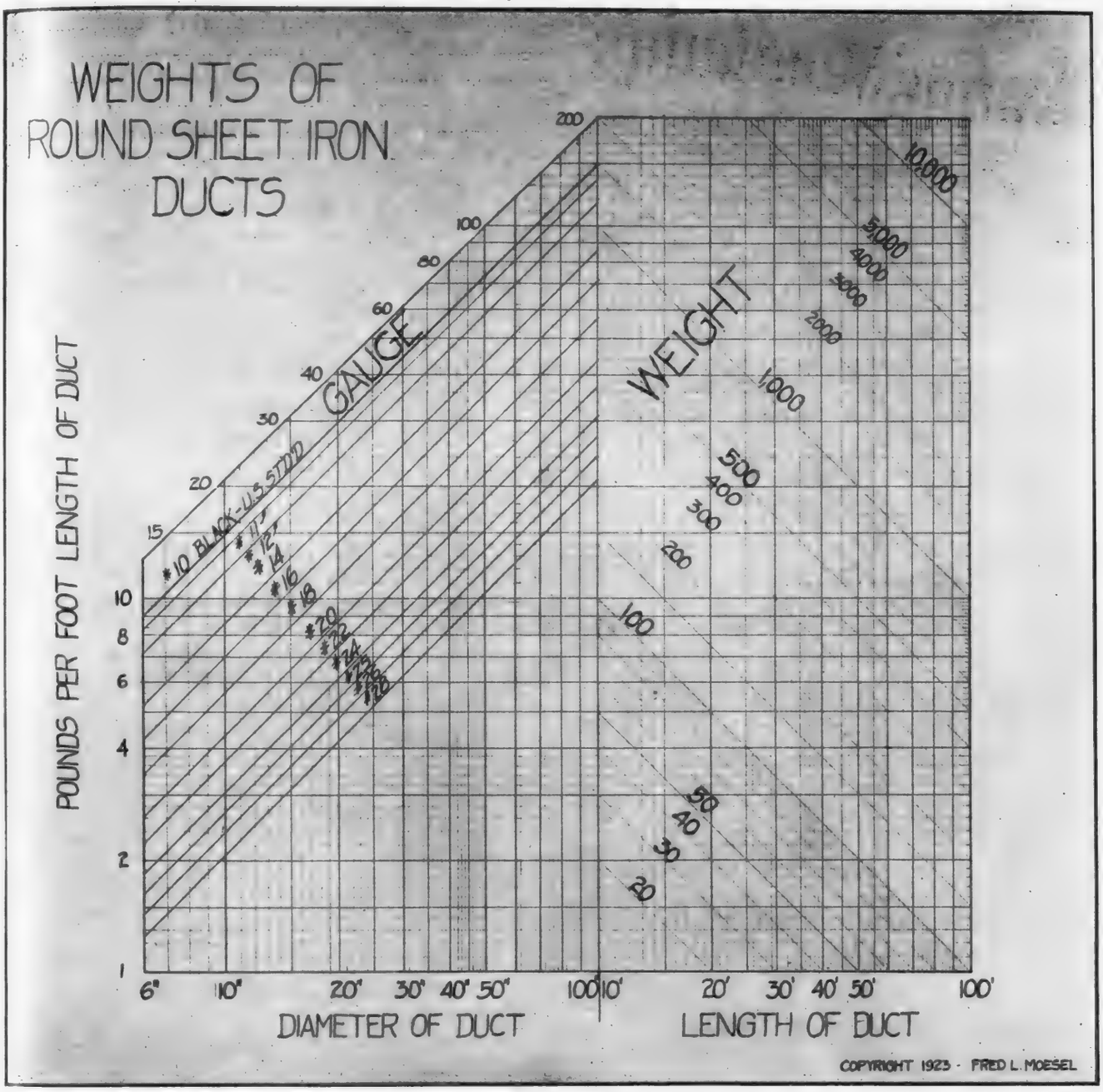


CHART 5—FOR ROUND DUCTS FROM 6 IN. UP TO 100 IN. DIAMETER.

move along this line to the right half of the chart until the line indicating the length of run is reached. The total weight is obtained from the diagonal passing through this point.

TO FIND THE WEIGHTS OF OTHER LENGTHS THAN THOSE GIVEN

To read the weight of any other length of duct than those between 10 ft. and 100 ft. on any of the charts, use a multiple of the number. For example, 5 ft. of duct can be secured by reading the weight for 50 ft. and moving the decimal point one place to the left. For larger runs, such as 165 ft., read the weight for 16.5 ft. and move the decimal point one place to the right.

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ONE of the hardest jobs of an editor is to tone down the enthusiastic accounts of manufactured products, especially when prepared by interested parties. This applies particularly to descriptions of new devices. Inevitably, it would seem, the hopes of those producing a new appliance are bound up in their glowing accounts of its wonders and very often nothing seems too extravagant to claim regarding the place the new product should occupy in the advance of the art. Such expressions as "perfect operation" and "cannot get out of order" are bad enough, but when a direct comparison is made with other devices of the same general type, of course, to their disadvantage, the blue pencil has to be used without mercy. In this way, very often, the original manuscript is hardly recognizable in the published description and there is then the need of more or less explaining to satisfy the injured feelings of those who feel that their best points have been ruthlessly slashed.

When will the industries, as a class, appreciate the fact that it is quite impossible, in a responsible trade journal, to extol any appliance at the expense of another, especially when no facts, but only arguments, are set forth to support the claims made? Inevitably, a published description carries with it a certain approval of the journal in which it appears. This point may, or may not, be lost sight of when invidious comparisons are made, but we doubt very much if the writers of such descriptions appreciate how embarrassing it would be to the publishers to have their matter appear verbatim, or how much needless work is imposed upon the copy readers to detect and eliminate those things which are, to say the least, not pertinent to the immediate subject discussed.

But, beyond that, if the industries only knew it and we believe, as a class, they do, the average reader is infinitely more impressed by a moderate statement of the virtues of a given appliance than by extraordinary claims made for it. The reader, it must be remembered, is usually "wise" and when he is told that the construction of a product is "perfect" and that it is about to "revolutionize the industry," it just brings a smile or, what is worse in its effect, he is likely to lose patience and toss away the article half read as being thinly-disguised propaganda or selling talk.

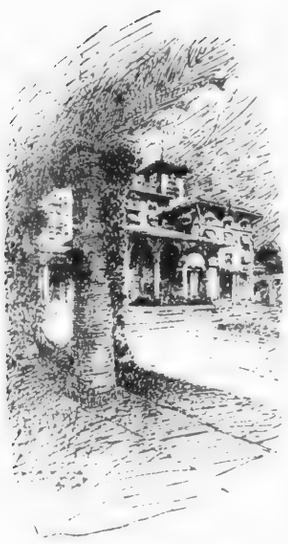
Many discerning manufacturers are adopting the more moderate tone in describing their products and this not only gets them further with the men they want to reach, but enables them to secure a more extended account of their product, in the reading columns of a trade journal, at least, than they could secure in any other way.

FROM the comments made in recent issues upon such projects as the establishment of underground parking spaces for automobiles in the large cities, and the possible need of ventilating busy city street corners where the autmobile traffic is especially congested, it might seem that an effort was being made to seek out the bizarre for the amusement and edification of our readers. At the risk however, of being tagged with that imputation, duly compels us to note the most extraordinary proposal of all, made by no less responsible a body than the engineers of the Nela Park Research Laboratories of the General Electric Company.

Based upon preliminary findings, these engineers express their belief that office buildings of the future will be without windows, dependent entirely on artificial light and given ventilation by artificial means. These preliminary findings show that daylight actually costs more to factories, museums, office buildings and public structures than electric illumination, attributable, in most cases, to the ground areas given over to courts or light shafts. Other reasons for the belief that windowless buildings are not far in the distance are set forth by the engineers as the cost of replacement of glass and general maintenance, loss of heat because of windows, and the tremendous cost incidental to the fading of decorations and cost of removing the large quantities of dirt and soot that blow in through the windows. And yet they say there is nothing new under the sun.

WHEN the two major conventions in the heating industry can be so well attended and generally successful as were those of the American Society of Heating and Ventilating Engineers and the Heating and Piping Contractors' Association, it can be taken as a pretty good indication of the prevailing state of prosperity in the fields they represent. What is more, the consensus of opinion at both meetings was one of sustained business activity on the present plane, in spite of the forebodings in some quarters. Labor troubles, of course are possible, but it was generally felt that Labor will discover, if it does not already know, when the "last straw" has been added to the camel's back.

American Society of Heating and Ventilating Engineers Meets Challenge of Ventilation Standards at Its Semi-Annual Meeting



South Shore Country Club

WITH the report of the New York State Commission on Ventilation fresh from the press and with the announcement of the plans for the development of a code of heating and ventilating equipment, the American Society of Heating and Ventilating Engineers had plenty to talk about at its semi-annual meeting, in Chicago, May 21-23 1923.

Throughout the sessions "the report" occupied a prominent place in the lobby talk and when it came to the formal discussion of the subject, at the last session of the meeting, the feelings of the members were registered in no uncertain terms. Perhaps the judgment of the society was best expressed by Former President C. L. Riley when he stated it was evident from the report that the commission had exhausted its funds before completing its work and that the story might have been very different if the plans as originally outlined, of testing school buildings under a wide variety of conditions, had been carried out. As it was the conclusions were based on partial evidence and he felt the society should get in touch with the commission with the idea of taking up the threads of the investigation and completing the program, as projected by the commission.

Dr. E. Vernon Hill declared that the commission in its investigation had arrived at a point reached by the society some years ago. The advances made in the art since that time were so great that the society would be retracing its steps to give more than passing attention to the commission's findings.

Written discussions of the commission's report were presented by Samuel R Lewis and Edwin S. Hallett. Mr. Lewis took up the particular recommendation of the commission regarding open-window ventilation with gravity exhaust and gave the results of his observation of systems of this description showing how utterly inadequate they were in actual operation. He mentioned particularly the effect of opening the doors into the corridors which was a common practice with window-ventilated rooms and which led to disastrous results. He also called attention to the necessity, with these systems, of having the janitor go through the building each night and close the windows, the neglect of which was an item of no small importance in connection with the fuel costs.

Mr. Hallett's discussion pitted the results obtained in the ventilation of the St. Louis schools against those reported by the commission in the schools it investigated. The best results, he declared, can only be secured with a mechanical system, using ozone, and a plenum system is the only one that will distribute ozone.

A letter was also read from D. D. Kimball, former president of the society, who was a member of the commission. In his letter Mr. Kimball called attention to the conditions and qualifications that were mentioned in the report in connection with the use of open-window ventilation and he recommended the appointment of a committee to analyze the report so that its findings would be clearly understood and not misinterpreted. As a matter of fact, he said, in most instances, a "split" system would provide the best ventilation in most school rooms.

PRESIDENT H. P. GANT
of American Society of Heating and Ventilating Engineers.

Dr. Shepherd, the originator of the "comfort line" as an indication of satisfactory atmospheric conditions, was introduced. He told of the propaganda already going over the country as a result of the New York State Commission's report. An organization of teachers, he said, which will meet in San Francisco in July will consider a committee report recommending the elimination of all mechanical systems of ventilation.

He felt that a very serious situation confronted the profession and industry and the society should take measures to counteract the effect of the report.

This was confirmed by Mr. Hallett who stated that at a recent convention of school superintendents in St. Louis, he was told that if the report had been published four weeks earlier, it would probably have held up indefinitely the awarding of many schoolhouse heating and ventilating contracts.

COMMITTEE TO ANALYZE REPORT.

On motion of Vice-President Homer Addams a resolution was adopted instructing the president to appoint a committee to consider the report and to submit its recommendations at the society's next annual meeting of the society.

There was some feeling that quicker action was desirable but Former President J. I. Lyle expressed the prevailing sentiment when he said the society should not take precipitate action and that, in fact it would not be altogether a misfortune if the commission's recommendations were put into practice. The public would then see how such systems would operate and their reaction might come quicker that way than through any action the society might take.

The registration was the largest ever reported at a semi-annual meeting of the society, the figure reaching the 575 mark.

Opening Session, May 21.

Chairman H. M. Hart of the Ways and Means Committee of the Illinois Chapter welcomed the members and guests to the Windy City. President H. P. Gant then assumed the chair and introduced Mr. Moss of the Chicago Chamber of Commerce. Mr. Moss made a welcome address that was enthusiastically received and the meeting then proceeded to business.

Reports received from the chapters were ordered printed in the society's *Journal.*

For the Membership Committee, Chairman C. V. Haynes reported an increase of 332 members since January of this year. The society's membership now totals 1684, made up of 1386 active members, 210 associates and 88 juniors. The membership by chapters is as follows: Colorado 26, Illinois 159, Kansas City 53, Massachusetts 75, Michigan 115, Minnesota 62, New York 179, Western New York 88, Ohio 79, Ontario 31, Philadelphia 240, Pittsburgh 85, St. Louis 61, and Wisconsin 18.

It was announced that E. C. Evans had been appointed the new chairman of the Committee on Chapters.

The Guide Publication Committee reported that the Guide for 1923 is now on the press. In addition to an enlarged text section the Guide will contain the roll of members. Suggestions for improving the Guide were submitted by the Philadelphia Chapter, being presented by Mr. Hedges.

A report of the receipts and expenses at the Washington meeting last January showed a balance on the right side of the ledger of our $400.00 all of which had been turned over to the Research Laboratory.

Dean F. Paul Anderson presented the Standard Code for Testing Fans, as approved by the Fan Manufacturers' Association, and recommended its adoption by the society. Previous to the compilation of the code, he said, there was no unanimity regarding the capacities of fans. With this code, he added, fans will all be rated on the same basis and he characterized the achievement as one that would serve as a model and precedent for similar action on other apparatus used in heating work.

The report on the ballot covering the proposed amended constitution showed its adoption by an almost unaminous vote.

The session concluded with a report on the recent building code of the U. S. Department of Commerce.

Afternoon and Evening Sessions, May 21.

Both the afternoon and evening sessions on Monday were devoted to a discussion of the proposed code on heating and ventilating which is being compiled under the general chairmanship of L. A. Harding. No less than fifteen sub-committees are at work on the various sections of the code.

As General Chairman Harding stated, the code is to be one of design and it is hoped to have it completed by the time of the society's next annual meeting.

Section 1 on definitions was discussed by Dean Anderson, chairman, who spoke of the great need of standard definitions of terms and practices in heating and ventilating work.

Section 2 on minimum ventilation requirements was discussed by Dr. E. Vernon Hill, chairman, who stated it to be his understanding that it was intended to define the conditions to be met, rather than methods of meeting them. Even at that, he stated, the work was one of great magnitude. This method of treating the subject of Section 2 was approved by the meeting.

Others who spoke on the various sections were Professor A. C. Willard Chairman of Section 4 (estimating heating requirements); C. L. Riley, chairman of Section 5 (figuring radiating surface); L. C. Soule, Chairman of Section 6 (figuring indirect radiating surface); and J. R. McColl, Chairman of Section 9 (design of smoke flues, breechings and chimneys.)

Section 7 on boilers came in for discussion at the evening session. One point made by Mr. Hart, was that the term "attention period" should be used instead of "firing period." Homer R. Linn suggested that boilers should be rated on B. T. U. output.

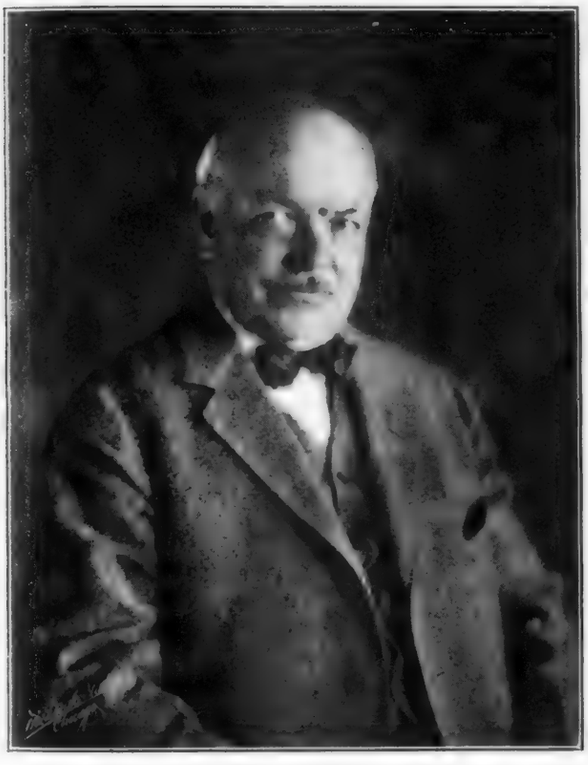
Other sections discussed were Section 11 on pipe sizes for water heating, Section 12 on air ducts, Section 13 on air washers and humidifiers, Section 14 on pumps and Section 15 on symbols. In connection with Section 13 the practice was mentioned of using these units as air scrubbers instead of air washers in places where it was necessary to keep down the humidity.

Morning Session, May 22.

Both the morning and afternoon sessions on Thursday were given over to the achievements of the society's Research Laboratory in Pittsburgh. Chairman E. E. McNair of the Committee on Research reported that the present year's budget of expenses of the laboratory will be met by the funds in hand. In the fall, however, a campaign will be inaugurated for the continued support of the research work.

Director F. Paul Anderson outlined the subjects that were about to be presented. Research work, he said, is beginning to occupy its real place in American industrial life. In answer to those who feel that research work should be a government function, Dean Anderson expressed the opinion that government institutions are not the ideal place for this work. In his judgment better results are obtained by having the work done by the industries interested and by societies.

Speaking of the investigation of ozone at the Research Laboratory, he said no doubt there was virtue in



DEAN ANDERSON
Director of the A. S. H. & V. E. Research Laboratory.

ozone and that it can be used with profit in ventilating work. Just what its effect is we do not know. It is necessary to know whether ozone is injurious and the investigations in the Research Laboratory have shown that up to ½ parts in 1,000,000 parts of air, it is not harmful. The other important question is: how can we measure the amount of ozone in the atmosphere. A method of doing this, he said, has now been successfully developed.

The laboratory staff, added Dean Anderson, has also developed a stable method of determining the dust in the atmosphere and he instanced particularly the clearness that had been observed of inhaled cigarette smoke. "Your lungs," he said, "are the filters in this case," although he added that this statement was not to be taken as propaganda against cigarette smoking.

Referring to a desire expressed in some quarters that the Research Laboratory devote more attention to the subject of heating, Dean Anderson emphasized the point that, after all, ventilation is the all-important problem in heating and ventilating engineering. However, to show how much attention is being given to the subject of heat, he mentioned the development at the laboratory of the "heat meter," an instrument which actually measures the flow of heat through building materials. This instrument, he said, has been perfected and will be presented at the next meeting of the society.

Other heating subjects on which the laboratory is at work are capacities of pipes and orifices, especially wet and dry returns.

The work being carried on to establish the so-called "comfort zone" is yielding results which confirm the previous tests made. The results of this work, he said, were being arranged for practical use in connection with the society's Synthetic Air Chart.

The papers of the Research Laboratory were then presented. The first paper, by W. P. Yant, G. W. Jones and F. C. Houghten, on "Ozone, Some of Its Uses and a Field Method of Detection," was presented by Mr. Yant.

A Field Method for Determination of Ozone.

In this paper Mr. Yant presented an adaptation of the apparatus and procedure used by the Selby Smelter Commission in determining small amounts of sulphur dioxide in atmospheric air. This method consists in obtaining a sample of the air in a partially evacuated 24-liter sample bottle and absorbing the SO_2 by slaking with a solution of starch and KI made slightly blue with free iodine. The resulting color is compared in test bottles to an equal portion of absorbing solution from the same stock similarly slaken in another sample bottle with pure air. Any loss of color due to the SO_2 removing some of the iodine is restored by the addition of standard iodine from a burette. From the volume of iodine solution required the volume of SO_2 is calculated.

The reaction in the determination of SO_2

$$SO_2 + I_2 + 2\ H_2O = 2\ HI + H_2\ SO_4$$

in which free iodine goes into combination and a decrease of color occurs, is opposite to the one with ozone in which iodine is liberated from compounds of iodine, thus increasing the amount of color. However, the only difference in the determination is that rather than having to restore the blue color to equal that of the control as in the case of SO_2, the color of the control is made to equal that resulting from the sample containing ozone. Otherwise the procedure and calculation are similar.

Mr. Yant gave a demonstration of the use of his apparatus showing how easily and quickly the determinations of the amounts of ozone may be made. The whole operation was completed in a few minutes.

In discussing this paper, E. S. Hallett stated that 43 St. Louis schools are now equipped with ozone apparatus. The concentrations have been standardized at a point just below that giving an odor. A statement that ozone affects only dead tissues in the body brought forth statements from Dr. E. Vernon Hill and Mr. Yant that ozone does not have such a selective action. Dr. Hill added that he was glad to see ozone assuming its proper place as a useful adjunct in ventilating work.

S. H. Katz, of the research staff of the Bureau of Mines, presented a paper on "Ventilation of Garages."

Ventilation of Garages.

This paper contained useful data on the volumes of carbon monoxide gas discharged from various automobile engines and on the volumes of air necessary to dilute the carbon monoxide to 1 part in 10,000 of air which was recommended as a safe concentration for workers in garages and shops. Natural ventilation, stated Mr. Katz, is only sufficient in summer when doors and windows are open, but special provision for removing the poisonous gas in winter when building are closed is sometimes desirable.

Mr. Katz pointed out that the effects of inhaling carbon monoxide, had been established by other investigators as follows:

Exposure to 0.4% (40 parts in 10,000) of carbon monoxide in air for one hour may kill a man.

A man doing sedentary work driving an automobile may breathe 0.04% (4 parts in 10,000) up to one hour without ill effects.

Exposure to 0.025% (2½ parts in 10,000) causes mild to moderate effects in one hour of strenuous exercise.

Continuous breathing of 0.01% (1 part in 10,000) produces no noticeable ill effects on adults in good health.

The author presented a table giving the average percentage and total volume per hour of carbon monoxide gas discharged by each of various types of passenger automobiles and trucks under full rated load and average of full and no load. The last column gives the volumes of pure air needed to dilute the carbon monoxide per car to 1 part in 10,000, which does not harm adults if breathed indefinitely; this dilution is recommended for garages and automobile shops.

A paper on "Further Observation in Dust Determinations," was presented by Miss Margaret Ingels, showing additional test results with the dust-measuring instrument developed at the laboratory. These tests confirmed its usefulness as a means of determining the comparative dustiness of the air.

The session concluded with the presentation of a paper by John Blizard, William Myler, Jr., J. K. Seabright and C. P. Yagloglou on "Heat Transference and Combustion in a Small Domestic Boiler Composed of Firepot and Dome Only." The boiler tested was a Winchester, made by the United States Radiator Corporation.

Heat Transference and Combustion in a Small Domestic Boiler.

This paper reported an investigation of combustion and heat transference in a small domestic boiler conducted by the Fuel Section of the U. S. Bureau of Mines, in cooperation with the Research Laboratory of the A. S. H. & V. E. An attempt was made to determine the relative amounts of heat absorbed by the fire-pot and each of the sections above it, the amount of free oxygen which finds its way from the ash-pit to the space above the fuel bed, and the value of the ordinary methods of admitting air through the fire door to burn the combustible gases rising from the fuel bed.

The method decided upon was to test first of all fire-pot alone so arranged that no secondary air could be admitted over the fuel-bed, then to add the various sections to the fire-pot and carry out successive tests to see how the efficiency increased or decreased with the addition of each section, with and without the admission of secondary air through the ports in the fire-door. Incidentally, it was decided to place the boiler on scales to determine the efficiency and heat losses with an accuracy greater than that usually obtained, though no novelty is claimed for this idea.

The results of the first series of trials showed conclusively that free oxygen finds its way from the ash-pit to the stack although seldom was there sufficient oxygen to burn the combustible gases, vapors and soot. It was concluded from the investigation that the gases and air must be ignited by some hot exposed portion of the fuel-bed or mixed with air which is preheated, or some means taken to partially reduce the cooling action of the fire-pot if the combustible gases are to be burned.

In the second series of trials air was admitted through ports in the fire-door provided for the purpose. Opening these air ports when burning coke and anthracite, gave an efficiency lower than when they were closed. But with bituminous coal, the admission of secondary air raised the efficiency somewhat at the highest rating.

The overall thermal efficiency of the boiler when burning anthracite and coke varied from 51% to 59% with the fire-pot alone as the heat-absorbing surface, between 57% and 60% when the dome was added to the fire-pot and the ports in the fire door were kept closed, and between 49% and 50% when the ports were open. The authors add that if the radiation and convection loss from the boiler can be regarded as useful heat, the total useful efficiency with coke and anthracite was about 70%. With bituminous coal the efficiency varied between 33% and 40% with the fire-pot only, between 41% and 48% with the fire-pot and dome and no secondary air, and between 40% and 44% with a supply of secondary air. All these efficiencies were obtained when firing by the spreading method.

When, during the second series of trials, the bituminous coal was fired by the coking method, the efficiency varied between 38% and 43% with no secondary air and between 41% and 46% with secondary air. Thus, conclude the authors, there is a considerable scope for improvement in the design of the ordinary domestic boiler when burning a high-volatile bituminous coal.

Mr. Nobis, in discussing the paper, declared that soft coal should never be used in round boilers. P. J. Dougherty noted the fact that in this type of boiler there was only a 5% gain due to the admission of air above the fire bed. John Howatt pointed out that one reason for the low efficiency of a small boiler is its fuel consumption during the fall and spring. With larger boilers, it is possible to block out some of the firepot and get economical operation in that way.

Afternoon Session, May 22.

At the afternoon session on Wednesday, W. J. McConnell presented a paper on "Further Studies of Physiological Reactions in Still Air, with Practical Applications," written jointly by him and F. C. Houghten and C. P. Yagloglou. This paper supplemented the

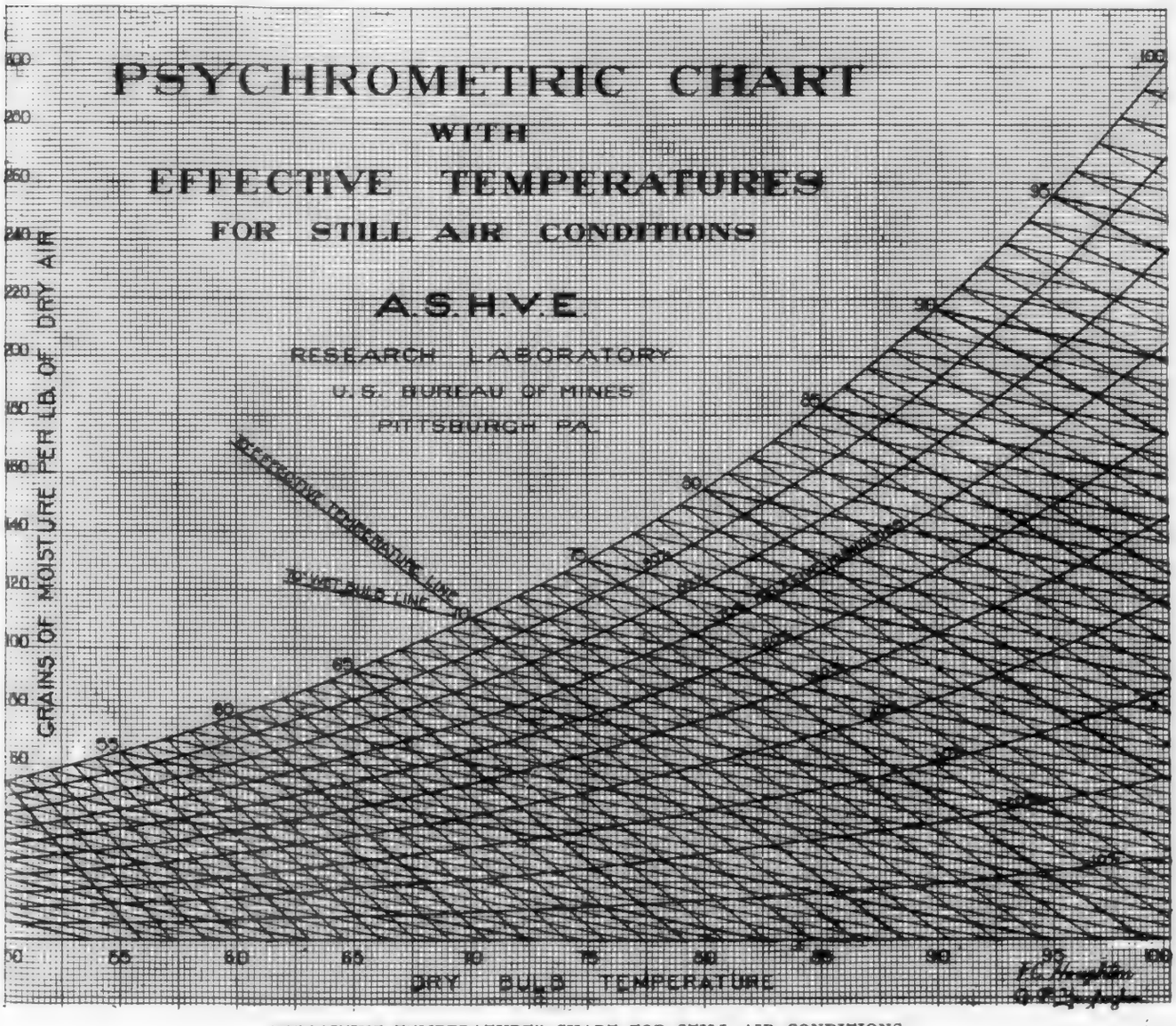
on presented by him at the Washington meeting of the society in January and gave the results of numerous additional experiments made to determine the physiological reactions to high temperatures and humidities with moving air. A more complete report of this phase of the work, said Mr. McConnell, may be expected at the society's next annual meeting. Up to date it has been found that for temperatures ranging from 90° to 110° "effective temperature," the dry-bulb is a very poor index of the physiological reactions which will result. The wet-bulb temperature is a better index, though not so good as "effective temperature."

Further Studies of "Effective Temperature."

Probably the most important paper submitted by the Research Laboratory was the one presented by F. C. Houghten on "Determination of the Comfort Zone, with Further Verification of Effective Temperatures Within this Zone." The first report of these tests was made at the society's January meeting. The establishment of the "comfort lines," or "effective temperature" lines, as they are now called, for still air conditions, was confirmed through tests on a considerable number of people. The paper contained an "effective temperature" chart in which the lines marked "effective temperature" are those of atmospheric conditions which give the same effect of comfort, or discomfort, as the case may be. In a typical case, for instance, the 64° "effective temperature" line, at a relative humidity of 50%, would mean a wet-bulb temperature of 57° and a dry-bulb temperature of 68°. On the other hand, if a temperature of 70° dry-bulb is taken, with a relative humidity of 30%, the "effective temperature" will be secured with a wet-bulb temperature of 53°.

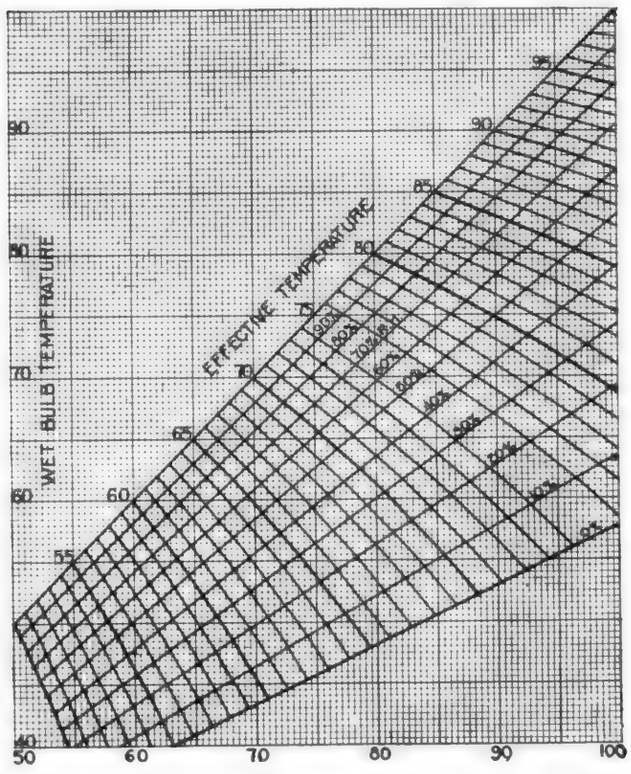
An interesting item brought out in connection with the experiments was the fact that Willis H. Carrier and Dr. E. Vernon Hill had submitted themselves to some of the tests. Photographs of them in their test regalia were shown, the costumes suggesting the garb of the Ku Klux Klan. Dr. Hill acted as a wet-bulb thermometer, his clothing and hood being completely saturated with water during the test, while Mr. Carrier's clothing was dry. Due to this fact they were promptly dubbed by the laboratory staff as "Dry-Bulb Willis" and "Wet-Bulb Doc."

In discussing the paper Dr. Hill expressed his agreement with the results secured to date. He stated that



"EFFECTIVE TEMPERATURE" CHART FOR STILL AIR CONDITIONS.

the "effective temperature" lines were more nearly a combination of wet-bulb and dry-bulb temperatures than he had previously believed to be the case. He still expected, however, to see a modification of the "effective temperature" lines, due to factors which had not as yet been considered. One of these factors, he said, was the radiant heat emitted from the dry walls of the test chamber.

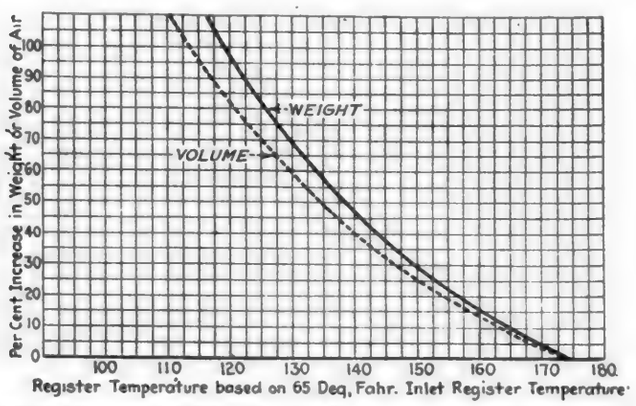


"EFFECTIVE TEMPERATURE" FOR DRY-BULB TEMPERATURES FROM 50° to 100°.

The final paper of the session was presented by Professor V. R. Day of the University of Illinois on "Temperatures at Registers of Warm-Air Heating Systems."

Register Temperatures in Warm-Air Heating.

This paper is a direct reply to those who have been favoring a maximum warm-air register temperature of 140° F. in furnace heating systems. As the author states, such a condition is not impossible of attainment in a building of excellent construction in which nice attention to weather proofing has been given. In a building of average construction, the author continues, a design based on such a low temperature would involve the use of much larger pipes and fittings than are used in plants operating at the more commonly accepted standard of 175°.



INCREASE IN WEIGHT OR VOLUME OF AIR TO GIVE CONSTANT HEATING EFFECT FOR VARIOUS REGISTER TEMPERATURES.

Curves and tables accompany the paper, showing the percentage increase in air quantities required to produce a common heating effect in terms of the quantity required at 175° F.

In concluding the author states: "On the basis of the arguments presented, it would appear impracticable to design warm-air installations on a temperature at the registers of 140° F. unless objections to the use of 6-in. studding are overcome."

In discussing the paper Mr. Langenberg said the tests proved that single air stacks are more effective than double stacks, due to their larger area. He said the next step in the research work, at the University of Illinois, would be the building of a house to check the results secured in the laboratory. Speaking of the warm-air furnace code, Mr. Langenberg stated that 200,000 copies of this code had been distributed, a large number of which were sent to architects.

New Move to Co-Operate with Architects.

E. M. Lane aroused the interest of the members at this point by expressing his belief that the society was not making its data sufficiently available to the practical man and that it was not taking the most effective means to get the facts brought out at its meetings into the hands of the public and especially the architects. He called attention to the formation of the Producers' Section of the American Institute of Architects and thought some means should be taken to get the society's data, in practical form, into the hands of the architects.

President Gant called upon Stewart A. Jellett to tell of his experiences in this connection. Mr. Jellett explained how the idea of having architects employ heating and ventilating engineers when necessary had been successfully put into practice many years ago. The architects, he said are showing a desire to co-operate and this spirit should be met more than half-way.

On motion of C. L. Riley, a committee was to be appointed, headed by Mr. Jellett, to take up the matter of closer co-operation with the architects on the lines suggested by Mr. Lane.

Morning Session, May 23.

The Thursday morning session was opened with the presentation of a paper by D. S. Boyden on "District Heating Progress in Boston."

District Heating Progress in Boston.

In introducing his subject Mr. Boyden made the point that the designation "central station heating system" is more or less ambiguous as it does not suggest any limitations to the area served and favored the expres-

sion "district heating" as a more comprehensive designation.

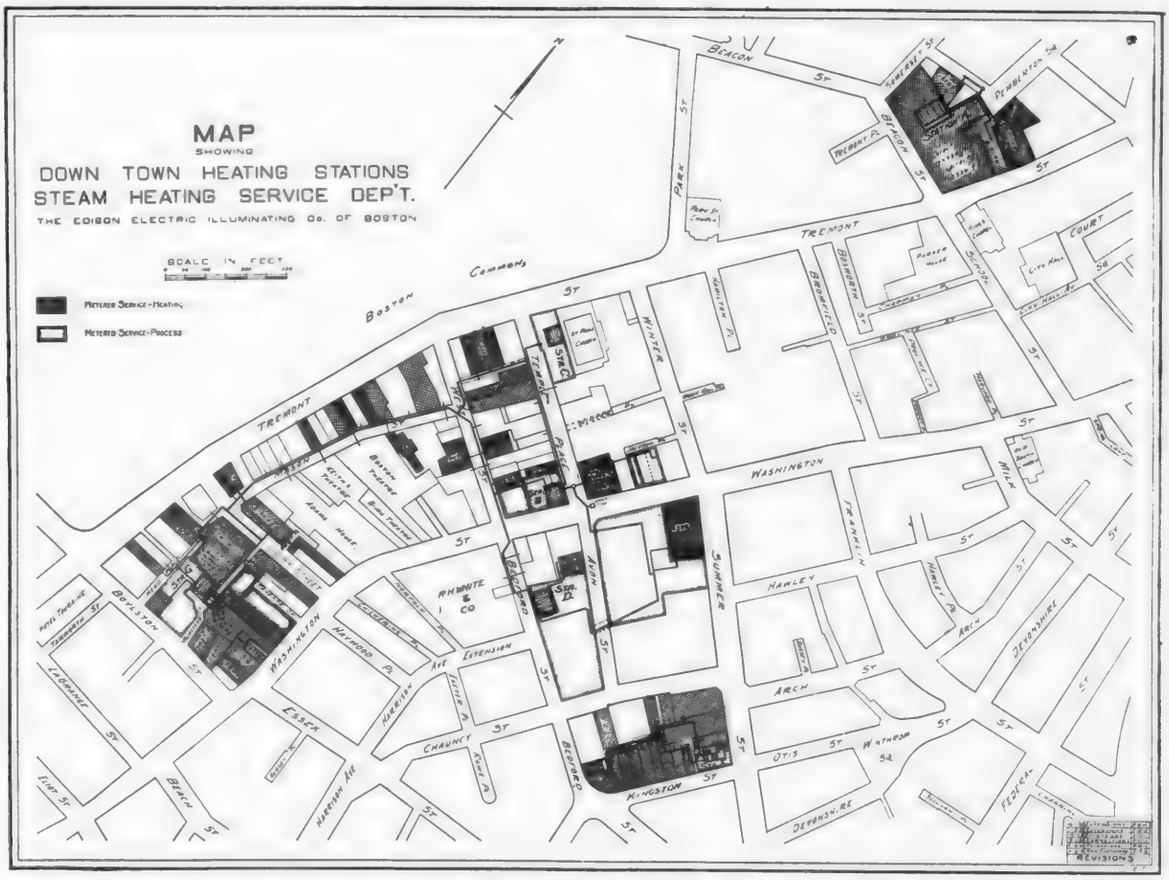
After discussing the factors which have affected the development of the district heating industry, he described the heating system of the Edison Electric Illuminating Company, of Boston, where steam has been supplied to properties adjoining the steam plants of the electric company since as long ago as 1887. At the present time there are seven individual heating stations, ranging in capacity from 10,200 lbs. of steam per hour to 34,000 lbs.

The total hourly capacity of these stations is approximately 150,000 lbs., or sufficient to supply 600,000 sq. ft. of direct radiation, or capable of heating to 70° F. in zero weather, buildings having a combined volume of 60,000,000 cu. ft.

The annual steam output of the seven stations has increased from 17,000,000 lbs. in 1905 to 165,000,000 lbs. in 1922. Six of these stations are located in an area having a radius of 500 ft., and four are within an area of a radius of 250 ft. Owing to the character of the service supplied by these several stations, it is necessary to keep them all in continuous operation throughout the year, although during the summer or non-atmospheric heating period, the total demand on the combined system is slightly greater than the capacity of the smallest station. This condition with a growing demand for steam service, gave rise to a serious consideration of the possibilities to be realized by the interconnecting of certain stations by underground steam mains.

STATIONS NOW INTERCONNECTED.

As a result of these considerations, the company has installed underground mains via Haymarket Place, Avery, Mason, West and Bedford Streets, and Temple Place, connecting five stations, thus bringing this group of stations into a single system. One station will be increased in boiler capacity from 14,000 lbs. per hour to approximately 56,000 lbs. This is accomplished by installing an additional boiler and equipping all boilers with mechanical stokers, and providing the necessary mechanical draft and automatic control. The station under normal operating conditions will be the base plant for the interconnected system, with the remaining stations serving as auxiliaries. The overall efficiency of the interconnected system will show a decided improvement over the previous method of operation, and, in addition, the interconnecting tie lines will serve as a distributing system in the streets mentioned, with a total length of 2,500 ft.



DOWNTOWN HEATING SYSTEM OF THE EDISON ELECTRIC ILLUMINATING COMPANY OF BOSTON.

PROBLEMS IN INSTALLING UNDERGROUND STEAM MAINS.

The installation of underground steam mains in a congested city street is not a simple problem, as it is necessary to keep a pipe at a predetermined grade, draining all low points, and the pipes must also be thoroughly insulated and water-proofed to preserve the structure and prevent undue waste of heat. These mains are installed at an approximate depth of 6 to 10 ft. below grade, depending upon the existing sub-structures and necessary drainage pitch. After the trench has been opened to the desired grade, approximately 4 ft. wide, a hollow tile under-drain is laid in crushed stone to take care of the drainage of surface waters. Upon this crushed stone, a foundation of 5 in. of con-

crete is laid and on this foundation, the pipe is installed with its necessary anchor supports and service connections, and where required, expansion joints are provided.

ALL PIPE JOINTS WELDED.

The pipe is genuine wrought-iron, all joints made by the oxy-acetylene welding process. At all anchor fittings, the pipe is welded to steel flanges. The steam pipe is covered with two layers of asbestos insulation, having a total thickness of 3 in. This is then covered with a 5-ply roofing paper which is cemented at the joints and then painted with two coats of asphaltum paint. The return line is insulated in a similar manner, but the insulation is necessarily not as thick, as the temperature of the condensation is very much lower than the temperature in the steam line.

Both pipes are then enclosed in a multi-cell vitrified tile envelope and plastered with mortar to provide protection against seepage entering the conduit. The temperature on the outer surface of the enclosing envelope is slightly higher than the surrounding soil, so perfect is the insulation. At intervals the hollow tile voids are sealed with asbestos cement to prevent transfer of heat by circulation. At all street intersections and other points where valves are installed, or where drainage of the steam main is required, suitable manholes are installed to receive the apparatus.

Expansion is taken care of by corrugated copper joints, corrugations being fitted with distance straps to limit the travel of the individual corrugations. The factor of safety to be employed per corrugation determines the width of the limit rings between corrugations. It is impossible to predetermine the proper pipe size of an underground main in a downtown city district, as the load distribution is constantly changing, therefore, these sizes are more or less arbitrarily selected.

In Boston, 4 in. and 8 in. mains are the standard, the former being used on alleys and dead end streets where the future loads can be approximately fixed; 8 in. mains are installed on all other streets or public alleys. The maximum allowable drop in steam pressure is maintained by reasonable increase of pressure at the source; further drops are taken care of by installing parallel lines on adjacent streets connecting them at street intersections. Booster feeder lines may be installed from the station to specific points in the network should the load exceed the capacity of the system mains. This practice gives the greatest flexibility for maintenance and at the same time provides a means for reducing the radiation losses during light load periods.

The steam business available from the distribution mains amounts to approximately 200,000,000 lbs. per year. Already new business to the extent of approximately 50,000,000 lbs. per year has been connected, and approximately 25,000,000 lbs. of new business has been contracted for.

Steam is transmitted at approximately 95 lbs. gage pressure and delivered to consumers through reducing valves furnished by the company at either 15 or 40 lbs. gage pressure, the pressure supplied being determined by the company. Service pipes to customers are either 2½ in., 4 in. or 6 in. as required. The pipe is extra strong and terminates in an extra-heavy gate valve of the inside yoke rising spindle type.

The reducing valve embodies in its design special protective features. With no steam flowing, the spring acts against the diaphragm keeping the valve closed. To put the valve into operation, the by-pass must be opened, allowing the initial pressure steam to flow into the low pressure side of the system and also into the diaphragm chamber. When the pressure builds up, it will act against the diaphragm, opening the valve, and allowing steam to flow through it. When the reducing valve has been opened, and is functioning, the by-pass valve is closed, allowing steam to pass through the reducing valve only.

Thus, if the pressure is lost in the diaphragm chamber, the spring automatically closes the valve, also if the customer should close the company's service valve, the reducing valve would be closed until opened in the manner described. As service and by-pass valves are sealed, a company representative must make the restoration. In event of a failure in the service valve requiring repairs, a section of the underground mains would have to be cut off, entailing an interruption of service, therefore, it is desirable to prolong the life of the service valve by using only in emergency cases. With the bursting of the diaphragm or pressure feeding pipe, the reducing valve automatically closes. Each reducing valve is made up as a standard fixture, irrespective of size. A pressure indicating gage is attached to the pressure feeding pipe which has a metal disc directly under the glass, a V-notch is cut in this through which the pressure if within 5 lbs. above or below normal, can be read. With the customer's stop valve closed and the reducing valve leaking, the pressure will go up and the pressure gage hand disappear.

USE OF SEMAPHORES TO INDICATE EXCESSIVE TEMPERATURES.

On the inlet to all condensation meters, a standard semaphore is installed which displays a signal when the temperature of the condensation has exceeded 130° F. A further signal is displayed when the temperature of the condensate has exceeded 175° F. Frequent indications of these temperatures being excessive, cause the necessary action to be taken with the customer to place his apparatus in proper condition to avoid these excessive temperatures. Semaphores are also installed on discharge lines of customers' approved pumping plants where the condensation is being returned to the company's return mains. The observations of this semaphore indicate when the condensate, has been returned at an abnormally low temperature. All customers' reducing valves, semaphores, and meters are read biweekly during the period which service is supplied.

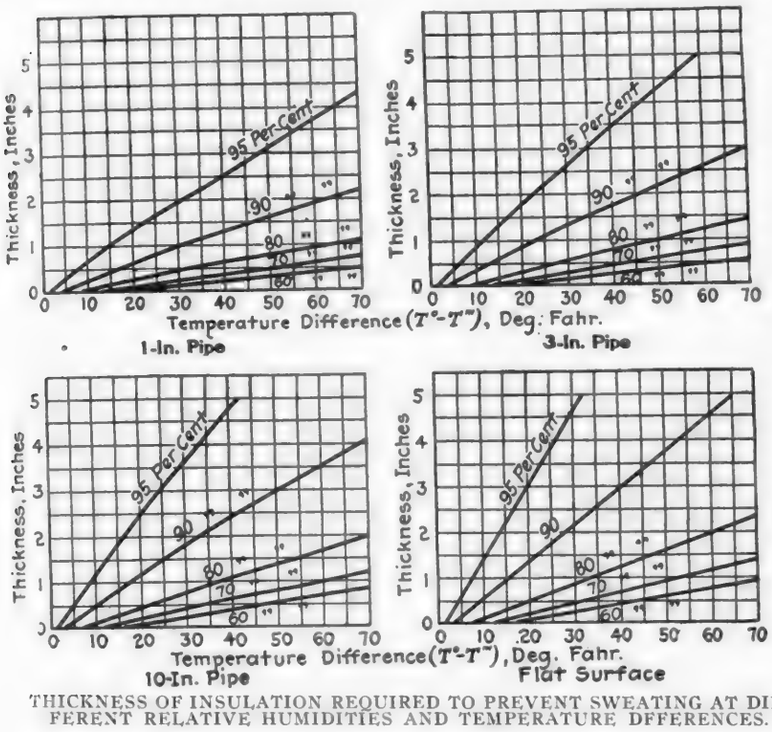
Where flow meters are used and the steam is maintained at a constant pressure, the meter accuracy compares favorably with the electric meter. This is also true of condensation meter when the condensation is maintained at a temperature not greater than 130° F.

L. L. Barrett presented a paper on "Insulation of Cold Surfaces to Prevent Sweating."

Insulation of Cold Surfaces to Prevent Sweating.

As the author states, it is the common practice to insulate cold surfaces with hair felt, cork, or similar

substances for the purpose of preventing sweating even when the question of the heat gained by such surfaces is of no economic importance. Such insulations are frequently applied without proper consideration of the conditions which will surround their use and in such cases they often fail to give satisfactory service. Sweating may occur on the surface of the insulation due to insufficient thickness or it may occur on the cold surface itself due to the fact that the insulation is not air tight.



THICKNESS OF INSULATION REQUIRED TO PREVENT SWEATING AT DIFFERENT RELATIVE HUMIDITIES AND TEMPERATURE DFFERENCES.

Mr. Barrett presents a mathematical basis for determining the thickness of insulation required to prevent sweating on the surface of the insulation under various conditions of temperature and humidity, and also presents curves which will obviate the necessity of any mathematical work in making practical determinations.

In the accompanying curves the temperature differences on the lower scale, of the charts, refer to the temperature of the air on the warm side of the insulation and the temperature of the medium on the cold side of the insulation.

A value of 0.3 for k has been used in the computation of the curves. As the thickness of covering required varies directly with the value of k, the thickness determined from the curves should be increased or decreased, according to whether the value of k is greater or less than 0.3, and by the percentage indicated in the following table:

VALUES OF k CORRESPONDING TO COMMONLY USED COVERINGS

	k	Per cent Variation from $k=0.3$
Hair Felt	0.246	—18%
Keystone Hair	0.27	—10%
Wood Felt	0.36	+20%
Cork, 6.9 lbs. per cubic foot	0.27	—10%
Cork, 9.7 lbs. per cubic foot	0.30	0%
Cork, 16 lbs. per cubic foot	0.35	+17%

After arriving at the correct thickness to prevent sweating on the outer surface of the insulation, the author mentioned as the next most important point the choice of an insulation that is as nearly air tight as possible.

A paper not on the program was then presented by Professor F. E. Giesecke on "Flow of Heat in Buildings as Determined by Resistance Wires." This paper described further results which had been secured by Professor Giesecke in a cold storage building, the equipment itself and the first series of results being described in THE HEATING AND VENTILATING MAGAZINE for August, 1922. Dean Anderson characterized the test as one of the first of its kind to be made in a completed building.

A paper on "Hot Water Heating at Chase Metal Works Plant at Waterbury, Conn.," by J. E. Williams, was read in abstract by Secretary Obert.

Final Session, May 23.

The final session of the meeting, Thursday afternoon, opened with the presentation of a paper on "Heating and Ventilation in Chicago Public Schools," by John Howatt, chief engineer of the Chicago Department of Education. The principal portions of Mr. Howatt's paper will be presented in next months' issue.

In discussing the paper Edwin S. Hallett, who is chief engineer of the St. Louis school board, advocated dry cleaning of air ducts in preference to wet cleaning. He thought that unless great care is taken, wet cleaning would result in a muddy condition in the duct which would make the dirt all the harder to remove. Comparing Chicago and St. Louis school operating costs, he gave a figure for the heating cost in St. Louis of 56 cents per pupil, as against $2.15 in Chicago, due, of course, to the recirculation of the air in St. Louis.

Samuel R. Lewis presented an outline of the proposed ventilation code of Wisconsin. In that State, the ventilation is in the hands of the State Industrial Commission. The draft of the new code has been endorsed by the advisory committee of the commission which is made up of engineers and others, Mr. Lewis being a member of the committee. The next step will be a series of hearings and the commission will then take final action on the code.

One of the features of the code is that the requirements read for rooms, rather than for buildings, and relate to the square feet of floor space, instead of the number of occupants. Special provision is made in the code to make the air ducts easily accessible, and no steam, water or air pipes are permitted in such ducts.

Discussion of New York State Ventilation Commission Report.

What many considered to be the climax of the meeting was reached when the report of the New York State Commission on Ventilation was brought up for discussion. Samuel R. Lewis was the first speaker. He presented a written discussion, as already noted, giving his

experiences with open-window ventilation. As a rule, the rooms on the windward sides of such buildings, he said, are the only ones to be ventilated. Those on the leeward side get warm air from the corridors. The corridor doors are not intended to be kept open, but the stifling conditions often existing in window-ventilated rooms make this action necessary.

Again, he said, it is not infrequently the case that the vent flues, with window ventilation, act as cold-air inlets. Exhaust ventilation, with cold-air inlets, he said, had not been found satisfactory. For one thing, the window inlets have to be closed every night by the janitor and opened again in the morning. Toilets, added Mr. Lewis, require mechanical ventilation. Finally, corridor doors cannot be kept closed.

Another written discussion was presented by E. S. Hallett who commented upon the fact that the report had received the full concurrence of D. D. Kimball, the only member of the commission who was a ventilating engineer.

The report, he said, carries the impression that the commission can suggest a system superior to that of the combined experience of all the heating and ventilating engineers. Why should high temperatures be decried in the report, he asked, when nobody proposed to provide them?

Effluvia, declared Mr. Hallett, can only be removed by a fan system. Another point he made was that we cannot keep the temperature down with hand control of radiators. Window ventilation also brings in dust and fumes from outdoors. Finally, the plenum system is the only one that will distribute ozone. Mr. Hallett characterized the use of cold-air rooms frequently used for school children as a cruelty to them and he said they should be prohibited by law.

C. L. Riley made the point that while the commission had laid out a program involving the investigation of ten different schemes of ventilation, it had only investigated two methods and it was evident, therefore, that the commission had never completed its work.

He felt that the society should offer to continue the investigation. As it is, the report in its present form is an obstacle in the way of progress. At the same time, he felt, action on the report should be taken with care.

John Howatt said the reaction of the public to the report was very significant, as the conclusions of the commission were already being widely accepted.

A letter received from D. D. Kimball was presented, defending the report, but expressing the belief that the conditions to be met in school work would ordinarily require a split system of heating and ventilation.

Homer Addams then offered a motion that the report and the discussion at the meeting be referred to a suitable committee of the society for consideration, conference and recommendations and that the committee report at the society's next annual meeting. After some discussion this motion was passed.

Professor J. W. Shepherd was introduced and, as already stated, told of the propaganda that was already sweeping the country condemning all forms of mechanical ventilation.

Following a special vote of thanks to the Illinois Chapter for its hospitality, the meeting adjourned.

Near Approach to Absolute Zero in Bureau of Standards Test

A Washington dispatch under date of April 7 reports a small quantity of frozen hydrogen and about two quarts of the same element liquefied, were produced at the Bureau of Standards in a successful test of liquefying apparatus conducted by C. W. Kanolt. This represented the result after chilling many thousand cubic feet of the gas down to a point close to absolute zero.

Several experiments were made with the hydrogen ice and liquid later before the Washington Philosophical Society, a scientific organization, where Mr. Kanolt exhibited the product. The frozen hydrogen was described as similar in appearance to snow, while the liquid was colorless.

Dr. Kanolt told his hearers that a gallon of liquefied hydrogen was made in about two hours at the Bureau of Standards. The experiments there are on a larger scale than has ever been employed before.

In his talk, as reported in *Refrigerating World* for April, he said:

"The method is rather simple in principle but involves practical difficulties which have interfered with its extensive use. The purpose of the Bureau of Standards has been first to secure liquid hydrogen when desired in very large quantities.

"The work at the bureau has been facilitated by the development of a method of analysis by which very small quantities of impurities can be measured. After liquid has been obtained, it is comparatively easy to freeze it by evaporating under reduced pressure. The freezing point of the liquid is minus 259° C., which is 14° above absolute zero.

In order to liquefy the gas, a temperature of 253° C.—about 420° F.—below zero had to be attained. The hydrogen ice began to form a few degrees lower, at about 430° F. below zero.

All the low temperatures were produced by expanding the gas itself after it had been compressed under pressure of 3,000 lbs. a square inch, chilled by application of liquid air and then allowed to expand.

Production of the liquid gases will be continued as a part of the bureau's experimental work in studying behavior of materials and metals at very low temperatures.

Hydrogen has been liquefied before in the United States, but temperatures lower than those induced in the process have only been reached hitherto in Europe, where helium has been successfully liquefied.

Absolute zero, represented by 273.1° on the centigrade scale and by 439.6° on the Fahrenheit has thus been very nearly approached, according to the above dispatch. Absolute zero represents the temperature where there is an entire absence of heat and has never been attained by man.

Can You Beat It?

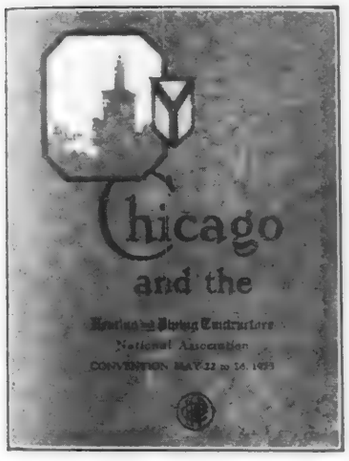
The following item is copied verbatim as it appeared in *The New York Herald* for April 19:

Carbonic Acid Gas Foe to Tuberculosis.

Physicians at the National Jewish Hospital for Consumptives report the discovery that carbonic acid gas is a foe to tuberculosis germs.

Heating and Piping Contractors' National Association

Prosperous Condition of the Industry Reflected in the Large Attendance at the Association's Thirty-Fourth Annual Convention



PERHAPS the most striking thing about the thirty-fourth annual convention of the Heating and Piping Contractors' National Association in Chicago, May 23-26, at the Hotel Drake, was the attendance. Such crowds of heating men have seldom, if ever before, been seen at a meeting of the heating contractors' association. It was, in truth, a gathering of the clans at which were present not only most of the old-timers, but an impressive number of new faces. All of which denoted the prosperity enjoyed by the heating industry, as well as the promise of good things in the meeting program itself.

The hotel's spacious lobby was continuously thronged with members and guests, while the supply trade has never before been so fully represented.

The convention followed immediately after the closing session of the heating engineers' meeting and it was characteristic of the two organizations that there should be a sharp change from the whole-souled, but quiet, enjoyment of the heating engneers' meeting to the care-free, holiday spirit of the heating contractors. It was Bill this and John that from the word go and those who hesitated to get into the thick of affairs quickly found themselves caught in an irresistible tide of good fellowship.

There was a note of sadness, however, at the opening session when it was announced that Mrs. George M. Getschow, wife of the president of the association, had died suddenly the day before. This prevented Mr. Getschow from presiding and presenting his address. His place was taken by Vice-President J. B. Walker, who stepped into the breach in a way that evoked many complimentary expressions.

VICE-PRESIDENT J. B WALKER WHO PRESIDED AT THE CONVENTION OF THE HEATING AND PIPING CONTRACTORS NATIONAL ASSOCIATION.

PRESIDENT'S ADDRESS.

President Getschow's address, which was read to the convention, was a tribute to trade association work in general and to the accomplishments of the Heating and Piping Contractors' National Association in particular. On the general subject of the obeyment of laws, he said:

"Under our form of government laws are made by the majority, to be obeyed by all. If a misguided majority or a well-organized minority succeed in passing a law which a sober-minded majority feel is an unjust invasion of private and personal privileges, it is your duty and mine to work peaceably and lawfully for its correction or repeal."

After dwelling on this point, he continued: "There has of late grown up in this country a multitude of legal restrictions, more and more centralized, multiplying regulations of private privileges and private judgment, a growing aggrandizement of government and such a multiplicity of laws that their equal and just enforcement has become practically impossible. This has served to produce in the mind of the average man a contempt for all laws, and for this condition, you and I are equally responsible.

"In utter disregard of our duties as citizens, we have been giving our time and thought to the heating and piping business, serenely confident that, as business men, we had no concern with politics. With politics we are not concerned, but with the affairs of properly governing this country we have an obligation which we can neither ignore nor escape.

"We need not be interested in politics, as the word is ordinarily used, but we should do our share, and it is expected of us as citizens, of the work necessary for a proper governing of this country. We

can and should exert our influences to aid in the curtailment of unjust, unfair and improper legislation, to the end that our fundamental system of government is not thoughtlessly changed, that those rights which we claim for ourselves are not impaired to others. A just respect for our government compels us to assist in enforcing laws until we can repeal them. To permit any person or any group of persons to decide what laws should be obeyed and what laws may be ignored, is anarchy in its worst form. We should not permit that, much less assist in it unless we desire that this government 'of the people, by the people, for the people, shall perish from the earth'."

Citing some of the advantages gained by organization of the heating industry, Mr. Getschow's address mentioned the progress made in influencing proper, progressive, assisting legislation; in the work of standardization of heating products and of heating specifications; in training apprentices; and in procuring certainty in the customs of the industry. President Getschow summed up the benefits to the individual of association membership as three-fold:

1. He proceeds according to the fixed ethics of his industry or trade and acquires the respect of the general public therefrom.

2. He is empowered by organization, through the medium of its official organ, to air his views, state his beliefs and insist on combined and concerted aid from his trades-brethern to aid him in having such views generally accepted.

3. He is, by reason of his association, empowered to frown upon and discourage unfair or improper legislation of irksome or restrictive nature to his industry.

4. He receives, and can give, through his organization, counsel, advice, learning, knowledge and the proper perspective of his entire industry.

5. He is kept abreast of the times and is informed of the discoveries, inventions, new methods and progress his particular trade or industry is making elsewhere.

"The industry itself," concluded the address, "through organization, becomes stabilized, custom is made more certain, progress is made easier, commercial intercourse freed of restrictive and retrogressive legislation, becomes easier and more pleasant, materials become uniform and standardized, and petty bickerings and strife fade from the scene."

A notable feature of the opening session was the address by E. J. Cattell, of Philadelphia, whose talk on "Optimism" will be remembered by those who attended the meeting of the heating engineers' society in Philadelphia two years ago.

Morning Session, May 24.

Important addresses were delivered at the Thursday morning session by Director F. Paul Anderson of the A. S. H. & V. E. Research Laboratory, and Harry A. Wheeler, the first president of the Chamber of Commerce of the United States.

Dean Anderson's address was a eulogy of the man who accomplishes things in the affairs of life and in this category he placed the heating contractor whose work, he said, advances the progress of civilization. Dean Anderson caught the interest of his hearers at the outset by relating his early experiences as a steam fitter's apprentice. His work at that occupation, he declared, gave him a joy of living and he still considered it one of the most profitable experiences of his life. At that time heating was practically a new science. There was something inspiring, he said, in the tremendous progress of the art during the past few years.

"I am more interested in men than in apparatus," declared Dean Anderson. Another of his epigrams was his definition of youth as the predominance of courage over timidity. The man who has courage, he said, does not grow old. Courage breeds the spirit of adventure and spreads the gospel of optimism. The optimism of our times is reflected in organizations like this of men who are doing things.

Dean Anderson apologized for being for 32 years dean of an engineering college (University of Kentucky) but declared he still had the spirit of adventure in his heart.

Many employers, he said, have murder in their hearts as soon as they see a college graduate. This is because so many college men leave their universities with the feeling that they are then in a position to instruct their employers. "Train the man in fundamentals," he said, "and he'll soon find out all about the apparatus he is to handle. No man can have engineering judgment at the age of 21 years. He should be taught the fundamentals and have a humble attitude as he enters commercial life."

"The true philosophy of life," he declared, "comes from men like you who are doing things."

Speaking of research work in general, Dean Anderson told how the old stock is passing away. The old apprenticeship system has also gone and it is a good plan to put on record the things we know. There is no progress if the secrets of industry are kept hidden. There is no finer sport, he added, than that of finding the laws applying to matter and energy.

Progress in any profession, he concluded, is a matter of youth. Youth is a state of mind and men get old by abandoning their ideals. Quoting the poet, he added: "Time goes, no; time stays, we go."

SECRETARY'S REPORT.

Secretary Henry B. Gombers reported an increase in the membership of the association. Among those interested in the association who have passed away during the year he mentioned George H. Reynolds, the first secretary of the association, who died the day after the convention of last year adjourned; also Walter J. Scholl, Youngstown, O.; Harrie D. Crane, Cincinnati, O.; B. W. Brady, Chicago; and John R. Sheehan, Schenectady, N. Y.

Under the heading of "Trade Ethics," he stated: "When the great increase in amount of business is considered, it would seem to be a source of congratulation that there has been practically no time spent in ironing out disputes or adjusting differences, such as were in evidence a number of years ago. It may be that our desire to use our good offices whenever called for in that direction has acted as a deterrent—at any rate, we wish it to be known that we are advocates of peaceful methods of settling disputes or misunderstandings."

At another point he said: "It is a commonplace that members often ask, 'What do I get out of the associa-

DINNER PARTY OF THE HEATING AND PIPING CONTRACTORS' NATIONAL ASSOCIATION AT THE DRAKE, ON THE OPENING NIGHT OF THE CONVENTION.

tion?' And it is such members who may not have as yet realized that they get only as much as they give. On the other hand, there are members who have had the honor of holding positions of the association who revel in delight when giving of their time and working hard for those whom they are serving."

"What can the association do for its members or others entitled to be served?" he asked and answered the query by stating:

"Under legislation it has been our custom to transmit to those whom we believe would be interested any information concerning bills introduced in any legislature of which we are informed.

"Under standardization we endeavor to keep our Committee on Standardization advised of matters that come within their jurisdiction," and he spoke particularly of this year's report of the Standardization Committee which has taken three years of intensive work to bring to its present stage.

The Associations' Handbook of Engineering Standards.

Reporting for the Committee on Standardization, Chairman Walter L. Fleisher announced that the work on the association's Handbook of Engineering Standards was now completed and the book itself would shortly be published. It is a manual of 50 pages and is intended principally to promote accuracy in figuring radiation.

After giving the formula used for the calculation of heat losses through building materials, together with an example, the manual contains transmission factors for glass, doors, walls, floors, roofs of all kinds, radiator transmission factors, conversion factors for various temperatures, notes on infiltration, notes on exposure and factors for enclosed radiators.

Mr. Fleisher suggested that the board of directors guarantee the quantities obtained from the handbook, such guarantees to take the place of other guarantees in proposals and specifications. Seven hundred copies of the book will be distributed to the members of the association, although Mr. Fleisher stated that the committee was in favor of making the handbook generally available to the public.

PRIZE-WINNING SLOGAN SUBMITTED BY YOUNGSTER.

For the Slogan Committee, Chairman W. H. Driscoll announced that the slogans and insignia received were on exhibition in the registration hall and that the members would be asked to express their opinion of them before the committee made its award. They attracted much interest and the committee finally awarded the prize for the best slogan to F. D. Kirsch, Jr., of Nanty-Glo, Pa., his suggestion being "Heat it with Radiators." Frank A. Merrill, chairman of the board of directors, was awarded the prize for the best insignia. Neither slogan nor insignia, however, will be adopted by the association. Probably the competition will be renewed.

Morning Session, May 25.

Important reports were presented at the Friday morning session by the Committee on Apprentices, J. E. Rutzler, chairman. Chairman Walter L. Fleisher of the Committee on Standardization also gave a further report on the Handbook of Engineering Standards, explaining in detail how the data given in the manual were to be used.

Afternoon Session, May 25.

A report on the National Trade Extension Bureau was made at the afternoon session by George Mehring, of the association's board of directors.

For the Committee on Legislation, Chairman J. B. Walker reported that the principal activity of the committee had been an effort to have the heads of the departments in Washington adopt the plan of separating the heating and ventilating, plumbing and electrical work from that of the general building.

The committee co-operated with similar committees from the National Association of Master Plumbers and the Association of Electragists-International. John F. McCarron of Washington, D. C., was employed to prepare a brief for presentation to the proper officers of the budget bureau. The brief came in at an opportune time, as General Lord, the head of the bureau of the Budget of the Treasury Department had just formed the Interdepartmental Board of Contracts and Adjustments, with Gordon A. Ramsey, an attorney of Chicago, as chairman. In the brief submitted by the association, examples of specific cases were given in detail, with all figures attached.

Immediately thereafter Mr. Ramsey invited members of his committee to speak on the subject presented or to ask any questions relating to it. Thus many phases were introduced and thoroughly discussed.

"While this board," concluded the report of the Legislation Committee, "cannot be expected to take any action that will establish a fixed future procedure in the separation of contracts, yet its composition was of such a high character, its reception so kindly, the expressed sentiments so favorable and the occasion so opportune, that we felt justified in hoping for positive and permanent results. Apparently there was no pronounced opposition in the attitude of any of the bureau's representatives, while the head of one of the largest and most important, though not wishing to be quoted, did not hesitate to pronounce himself most emphatically in favor of continuing what had always been their practice—the separation of the mechanical trades in all work under his supervisions."

Morning Session, May 26.

At the final sesson Saturday morning a number of resolutions were presented by the Resolutions Committee which was made up of J. E. Rutzler, chairman; R. T. Smith, of Pittsburgh; and Stewart A. Jellett, of Philadelphia.

1. WHEREAS, Divine Providence has seen fit to take out of this life, while still in her prime, Mrs. George M. Getschow, the wife and helpmate of many years of our beloved and esteemed President, and

WHEREAS, the passing of this life was with that suddenness that tends to shake the strongest of men, be it therefore

Resolved, that the members of the Heating and Piping Contractors' National Association, in Convention assembled, in the City of Chicago, Illinois, this twenty-sixth day of May, 1923, do hereby offer to Mr. George M. Getschow and his family that condolence, sympathy and support in this the hour of their personal bereavement and loss the only consolation humans can express one to the other, but which are so inadequate to convey the true feelings of the heart, and be it further

Resolved, that these resolutions be forwarded to Mr. Getschow and his family, and also appear in the next publication of our Official Bulletin.

(2) *Resolved*, that in order to provide for a continuity of service, it is requested that the President shall appoint annually a Conference Committee of five members in such a manner as to have serving each year at least three members who have served the previous year.

(3) *Resolved*, that it be brought to the attention of the members that the best interests of all heating and piping contractors require that when a definite plan and specification is the basis upon which an order for heating or piping is executed that the said contractor, in his own interest, should refuse to assume any guarantee for performance liability, and be it further

Resolved, that the conference committee confer with the American Institute of Architects in an effort to secure the elimination of such clauses from specification architects may put out for estimates or orders.

(4) WHEREAS, there has been enacted into law in sixteen states of the Union an act to regulate and license the practice of professional engineering and land surveying, and

WHEREAS, certain individuals and associations are actively engaged in an effort to extend the law in every state, and

WHEREAS, the law is couched in vague and ambiguous language which conceals its true purpose and affords no protection to the public as claimed, and

WHEREAS, the operation of this law may seriously affect the interests of the members of this association and interfere with their rights to pursue the usual practices of their industry, therefore be it

Resolved, that this association go on record as being opposed to such laws and that its membership be encouraged to actively and energetically work for the repeal of such laws in those states where they have been passed and oppose their passage in other states, and be it further.

Resolved, that as much publicity as possible be given to our opposition to these measures through such channels as may be available to our individual members and local associations.

(5) *Resolved*, that the resolution adopted at our Thirty-second Annual Convention, held in Boston, Mass., in 1921, be reiterated, which resolution reads as follows:

"*Resolved*, that the members of the Heating and Piping Contractors' National Association are opposed to the practice of our members, who do both heating and plumbing, submitting combined bids on heating and plumbing work, and that wherever possible separate proposals and contracts should be made for the above trades."

ELECTION OF OFFICERS.

Chairman Edmund Grassler, of the Nominating Committee, then presented the selection of officers for the ensuing year, all of whom were unanimously elected. The new officers are:

President, George M. Getschow, Chicago (re-elected); vice-president, Frank A. Merrill, Boston; treasurer, Frank W. Howard, Boston (re-elected); secretary, Henry B. Gombers. New directors: Frank A. Merrill, Boston; Edwin P. Ambler, Jr., St. Louis; and R. Templeton Smith, Pittsburgh, Pa.

American Society of Heating and Ventilating Engineers

Resignation of Secretary C. W. Obert.

After a service of seven years, Secretary C. W. Obert of the American Society of Heating and Ventilating Engineers has presented his resignation, to take effect at the close of the present year. In his letter to the council of the society, he states that the responsibilities of the position and the scope of the duties involved have now grown to such an extent as will render it undesirable to continue the dual secretarial arrangement which has existed, Mr. Obert being also secretary to the A. S. M. E. Boiler Code Committee.

Mr. Obert, in his letter, adds that he believes the society now demands all of the attention and executive effort that an engineer of ability and experience can give it by devoting his full time to the work.

In commenting upon Mr. Obert's resignation, a statement issued by President H. P. Gant, and concurred in by the council, expresses the regret with which Mr. Obert's resignation has been received and extends to him a large part of the credit for the splendid growth of the society from a membership of about 500 up to its present membership of about 2000.

New York Chapter Discusses Proposed Heating and Ventilating Code.

A special meeting of the New York Chapter, called to discuss the proposed code of minimum requirements of heating and ventilation, was held at the Building Trades Employers' Club, May 7. The speakers included President H. P. Gant of the American Society of Heating and Ventilating Engineers who outlined the project in a general way. He was followed by L. A. Harding, general chairman of the committee, who cited the benefits which had been derived from the adoption of building codes and anticipated that the same good results would follow from the compilation of a heating and ventilating code.

The meeting was later divided into groups, under various sub-chairmen who were present, including C. L. Riley, Walter S. Timmis, F. R. Still, Perry West, James A. Donnelly and L. C. Soulé.

The New York Chapter wound up its activities for the season with a vaudeville entertainment and "blow-out" at the Building Trades Club, May 21. The committee in charge for the evening was headed by Budd K. Strader, who was ably assisted by H. G. Issertell and Vice-President W. J. Olvany. It is safe to say that a good time was had by all.

Kansas City Chapter.

At the April meeting, which was held at the Savoy Hotel, April 16, a paper on "Saving the Squeal for Flour Mills" was presented by Mr. Millis, in which he gave a description of the process of milling flour. The views which accompanied his talk illustrated the method by which the wheat is handled from the time it enters the mill until it is ground into flour.

Following Mr. Millis's talk, Mr. Campbell described the utilization of the heat in the grinding mills to heat the mill by collecting this heat air through a dust collector on the top floor of the mill and recirculating the air, passing it over furnaces in the basement to add the additional heat necessary. (This process was described and illustrated in THE HEATING AND VENTILATING MAGAZINE for November, 1922.) Mr. Campbell's paper was supplemented by some remarks by Mr. Kriebiel, an experienced mill builder, who is building a new plant for the Kansas City Milling Company in North Kansis City, Mo., where Mr. Campbell's system is being tried out.

A spirited discussion followed the presentation of the subject, those taking part including Messrs. Clegg, Downes, Kitchen, Pines, McIntyre, Dunlap and Mills.

The second part of the meeting was devoted to a discussion of the proposed code of minimum requirements for heating and ventilating which is being compiled by the American Society of Heating and Ventilating Engineers. A resolution, offered by B. F. Cook, one of the governors of the Kansas City Chapter, expressed the sentiment that the establishment of such a code would be detrimental to the interests of constructor, owner and engineer and would restrict the progress and development of the heating and ventilating industry. He proposed that the chapter go on record as being opposed to the establishment of such a code. After considerable discussion, an amendment was offered by Mr. Kitchen, and seconded by Mr. Russell, to table the resolution until the next meeting, and to refer the matter, in the meantime, to the chapter's legislative committee with the idea of having the committee prepare a discussion of the code. This amendment was passed and the resolution adopted in that form.

Convention Guests Lavishly Entertained at the Meetings of Both Heating Engineers and Heating Contractors

Surrounded by all the luxuries of modern hotel life and participating in an entertainment program that could be correctly characterized as lavish, the week spent at the Drake Hotel, Chicago, by those who attended the semi-annual meeting of the American Society of Heating and Ventilating Engineers and the annual convention of the Heating and Piping Contractors' National Association will long be remembered as one of the gala weeks of their lives. Certainly nothing to excel it has ever before been experienced at the meetings of either body.

Immediately upon arrival at the hotel, the guests were given a glimpse of the beautiful surroundings they were about to enjoy. The registration hall used by both organizations had a fountain setting, with palms to soften the scene and gold fish to add the finishing touch.

The way from the registration room to the convention hall led through a series of stately corridors with glimpses through the windows of Lake Michigan and the Lake Shore Drive.

The meetings of both associations were held in the ballroom of the Drake and here was held also one of the feature dinners of the heating contractors' convention.

Another delight awaited the visitors at the heating engineers' meeting when they were taken by motor to the South Shore Country Club. Here, after an inspection of the club's sumptuous quarters, a dinner was served to the 500 guests present who completely filled the club's dining hall. Many comments were heard that it was one of the prettiest and best-arranged dinner parties the members of the society have ever attended. Dancing followed later in the club's beautiful ballroom.

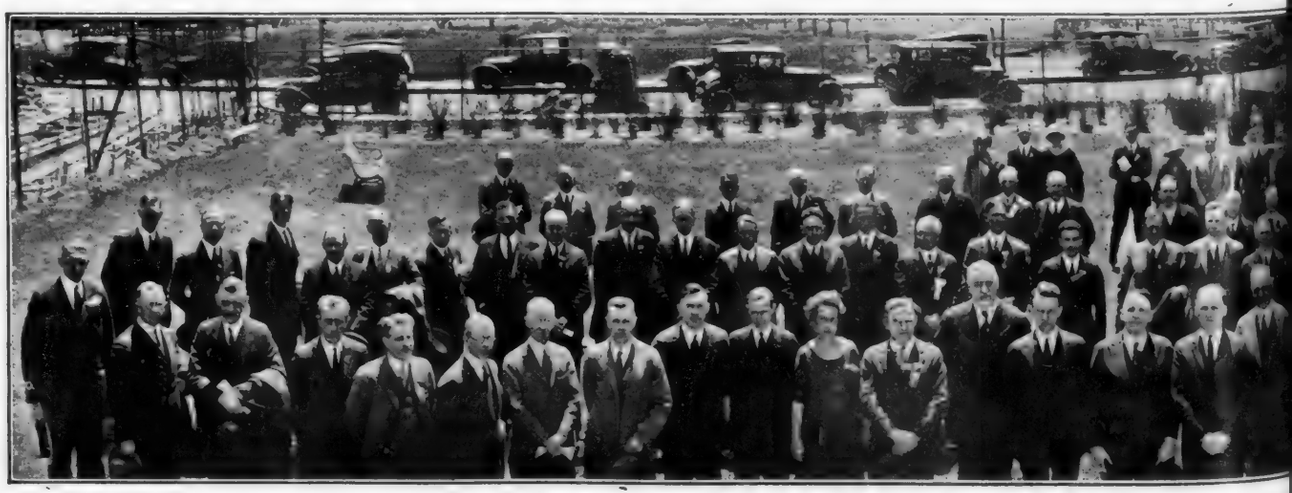
Still another major social event for the heating contractors was the motor trip through the Chicago north side parks to Evanston and return, the drive winding up at the Marigold Gardens where dinner was served to over 700 guests. The entertainment put on through and after the dinner, including Gertrude Hoffman and her troupe of dancing girls, was, to speak quite frankly, a "knockout." The writer is at a loss for words to expatiate properly upon the event.

The foregoing by no means covered all

HEATING AND PI

of the entertainment features o
meetings. Luncheon parties, b
Drake and at the South Shor
Club for the ladies, as well a
parties, followed one another
wildering succession.

The Illinois Chapter Com
charge of the heating engineer
tainment program was headed

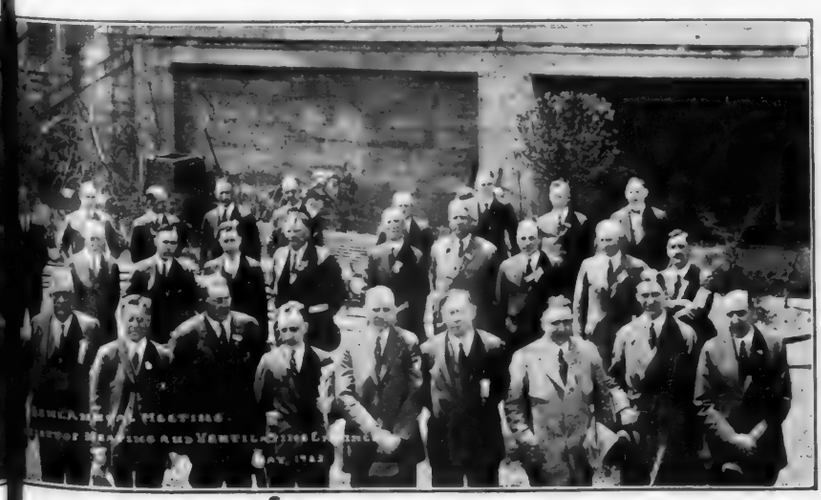


A PORTION OF THOSE WHO ATTENDED THE SEMI-ANNUAL MEETING OF THE AMERI CAN SOCIETY OF H

ORS' ASSOCIATION IN CONVENTION AT THE DRAKE, CHICAGO, MAY 23, 1923.

Hart, who is also president of the Chicago Master Steam Fitters' Association. The sub-committee chairmen were: Registration, W. B. Graves; finance, C. W. Johnson; publicity, J. G. Devar; hotel, A. A. Cutler, entertainment, A. B. Marin; reception, E. P. Heckel; automobile, George H. McGregor; ladies, Mrs. E. Vernon Hill. Benjamin Nelson, president of the Illinois Chapter, also figured prominently in the entertainment of the guests.

For the heating contractors' convention, the committee chairmen were: T. I. Magan, general chairman; R. T. Wray, G. H. Dickerson, E. J. Claffey, Mrs. J. A. Cook, F. W. Lamb, W. A. Pope and J. P. Baldwin.



NTILATING ENGINEERS, AT THE DRAKE, CHICAGO, MAY 20-23.

Current Heating and Ventilating Literature

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the article mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

BUILDINGS

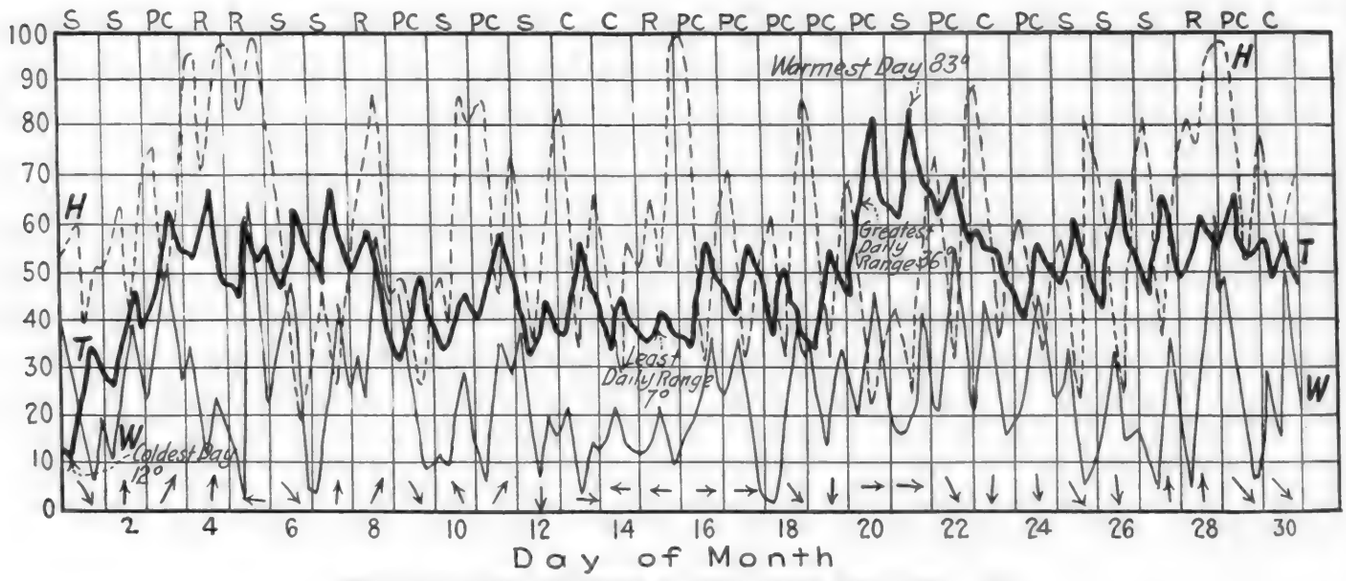
MECHANICAL EQUIPMENT. Meeting De Luxe Service Requirements. Power Plant Eng., Vol. 27, No. 5, Mar. 1, 1923, pp. 255-265, 12 Figs. Mechanical features of General Motors Building in Detroit, largest office building of its kind in world. Details of coal handling, boilers, refrigerating equipment, water systems, drinking-water sterilization, steam for heating, lighting and power distribution, elevators, etc.—30¢.

HEATING

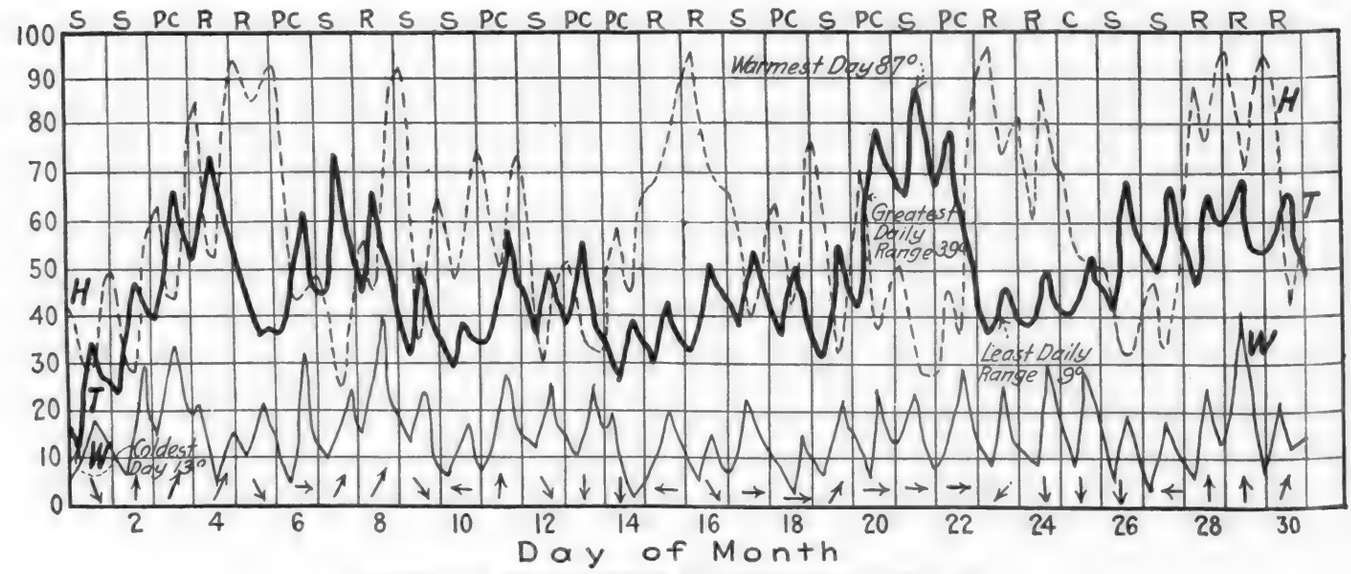
FACTORIES. Economical Factory Heating, Chas. F. Wade. Indus. Management (Lond.), Vol. 9, No. 4, Feb. 22, 1923, pp. 99-110, 3 Figs. Essential features of economical heating system in modern factory; most efficient methods of heat generation and distribution; fuel economy.—50¢.

The Weather for April, 1923

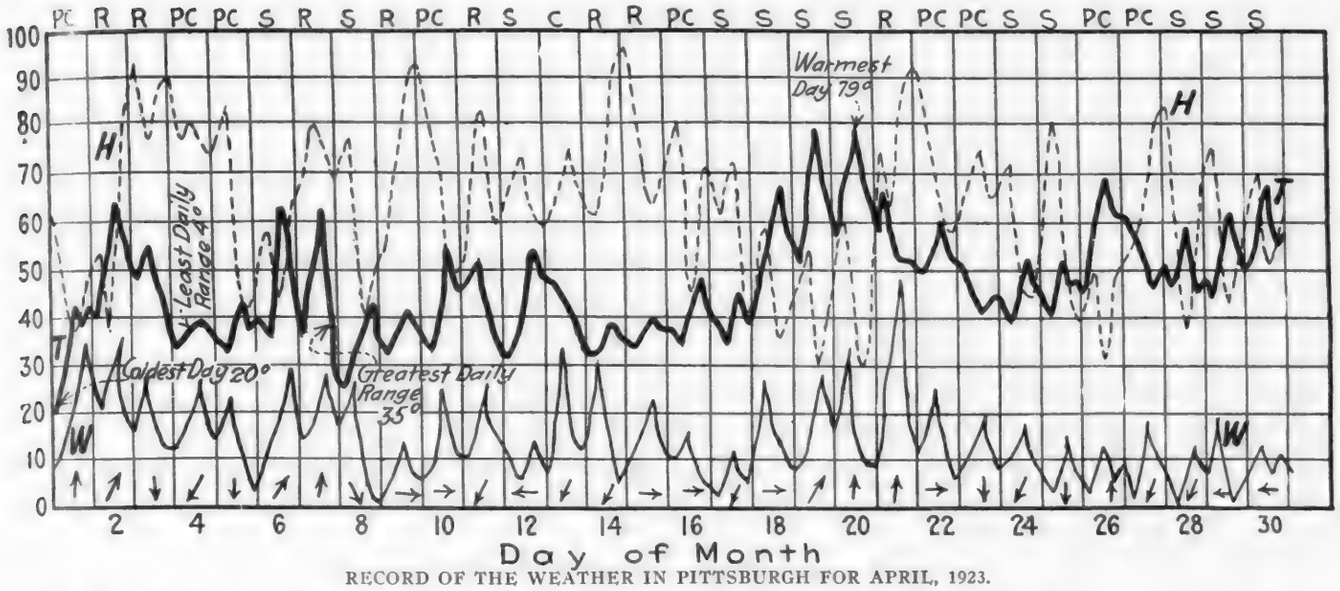
	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, degrees F.....	83	87	80	79	83
Date of highest temperature.....	21	21	4	20	30
Lowest temperature, degrees F.....	12	13	21	20	26
Date of lowest temperature.....	1	1	11	1	1
Greatest daily range, degrees F.....	36	39	1	35	44
Date of greatest daily range.....	20	20	37	7	7
Least daily range, degrees F.....	7	9	19	4	6
Date of least daily range.....	15	23	4	4	4
Mean temperature for month, degrees F.	49.4	48.1	49.8	46.6	55 0
Normal mean temp. for month, degrees F	49.4	46.4	51.2	47.7	55.8
Total rainfall, inches.....	2.07	5.26	3.82	1.38	3.20
Total snowfall, inches.....	0	Trace	3.0	0.6	Trace
Normal precipitation, this month, inches	3.30	3.55	2.90	2.88	3.52
Total wind movement, miles.....	15,208	9,077	9,586	9,398	10,231
Average hourly wind velocity, miles....	229	12.6	13.3	13.1	14.2
Prevailing direction of wind.....	N.W.	W.	S.W.	N.E.	S.
Number of clear days.....	9	9	7	12	7
Number of partly cloudy days.....	12	12	11	10	19
Number of cloudy days.....	9	9	12	8	4
Number of days on which rain fell.....	9	12	10	8	11
Number of days with snow.....	0	1	3	3	1
Snow on ground at end of month, inches	0	0	0	0	0



RECORD OF THE WEATHER IN NEW YORK FOR APRIL, 1923.
(Hourly Observations of Relative Humidity Plotted on this Chart.)



RECORD OF THE WEATHER IN BOSTON FOR APRIL, 1923.


PC R R PC PC S R S R PC R S C R R PC S S S S R PC PC S S PC PC S S S
Warmest Day 79°
Least Daily Range 4°
Coldest Day 20°
Greatest Daily Range 35°
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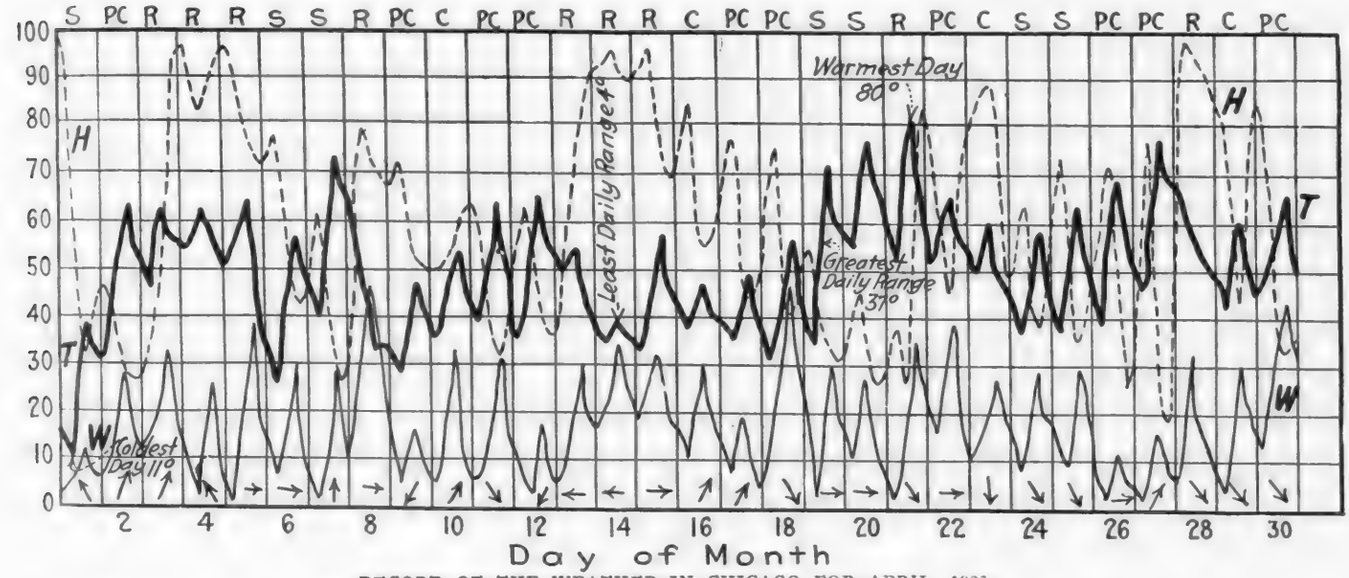
Day of Month

RECORD OF THE WEATHER IN PITTSBURGH FOR APRIL, 1923.


S PC R R R S S R PC C PC PC R R R C PC PC S S R PC C S S PC PC R C PC
Warmest Day 80°
Least Daily Range 4°
Greatest Daily Range 37°
Coldest Day 11°
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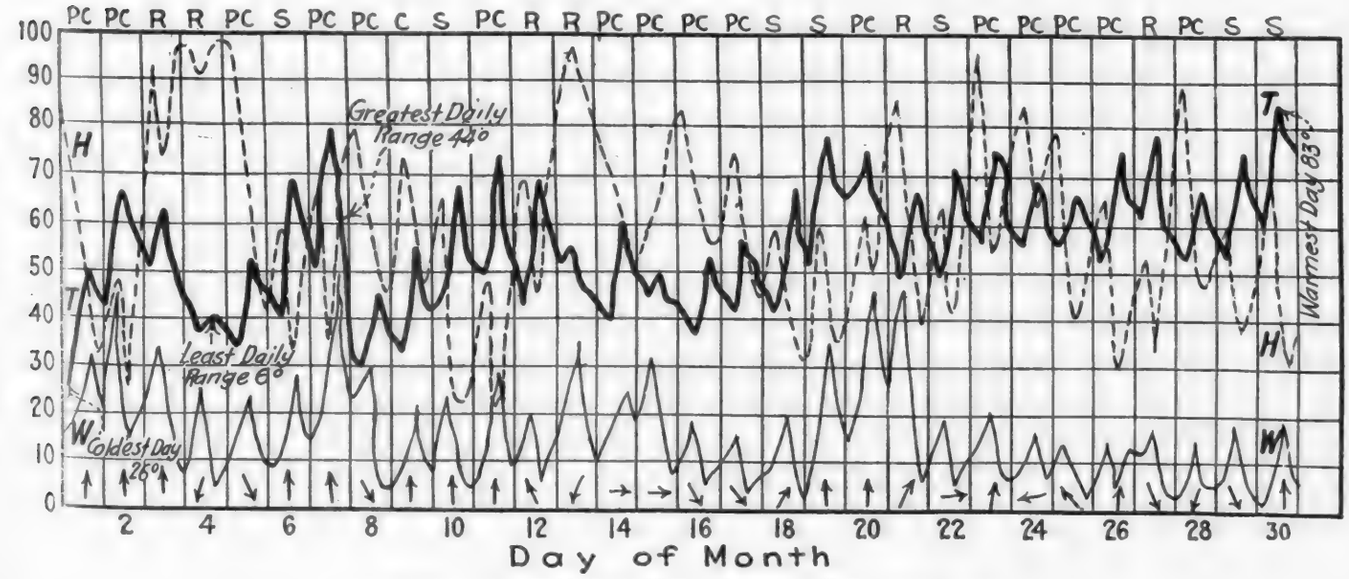
Day of Month

RECORD OF THE WEATHER IN CHICAGO FOR APRIL, 1923.


PC PC R R PC S PC PC C S PC R R PC PC PC PC S S PC R S PC PC PC PC R PC S S
Greatest Daily Range 44°
Least Daily Range 6°
Coldest Day 26°
Warmest Day 83°
H
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Day of Month

RECORD OF THE WEATHER IN ST. LOUIS FOR APRIL, 1923.

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau.
Heavy lines indicate temperature in degree F.
Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage form reading at 8 a. m., and 8 p. m.
S—Clear, P C—partly cloudy, C—cloudy, —rain, Sn—snow.
Arrows fly with prevailing directions of wind.

Correspondence

Getting Pipes Past Obstructions

EDITOR HEATING AND VENTILATING MAGAZINE:

Kindly advise if the sketch shown by Fig. 1 represents good steam fitting practice.

Denison, Iowa. W. H. S.

Obviously, where a pipe containing steam and condensate meets with an obstruction, the pipe must be divided into

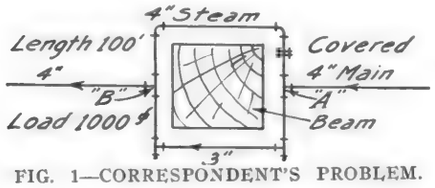


FIG. 1—CORRESPONDENT'S PROBLEM.

two branches, one extended above the interference full size for the supply of steam, and the other below, of size sufficient to pass the small amount of condensate produced by radiation losses.

For the latter purpose, and for the conditions submitted, a ¾ in. pipe would be large enough but to prevent stoppage from sediment, use a larger pipe, say 1¼ in., and place the union in this pipe to reduce the expense for this fitting. Also, reduce the 4 in. main to 3 in., a size which will supply 1,000 sq. ft. of cast-iron direct radiation at a drop in pressure of 1 oz. per 100 ft. of run, using low-pressure steam.

Run the upper pipe with easy turns over the beam (Fig. 2), so as to reduce friction to the flow of steam. Extend the lower pipe beyond the Y-fitting on the right-hand side to prevent carrying over

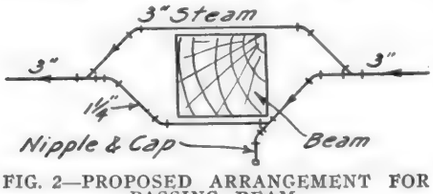


FIG. 2—PROPOSED ARRANGEMENT FOR PASSING BEAM.

the condensate, as would take place at "A" in Fig. 1, also return this pipe grade before the Y-fitting on the left-hand side to prevent contact of the steam with the condensate cooling in the lower pipe, as would otherwise occur (See points "A" and "B" in Fig. 1). If both of these suggestions are carried out, water hammer

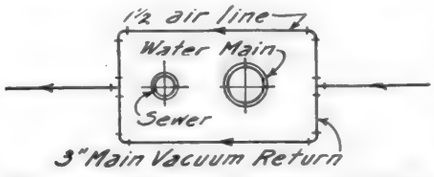


FIG. 3—METHOD OF PASSING VACUUM RETURN LINES AT SEWERS OR WATER MAINS.

will be eliminated, especially when the system is cold and started up.

Next, reduce the number of dirt pockets to one, and place that one in direct line of the flow so as to catch all sediment, using for this purpose a Y, also a nipple and cap, as a cap is easier to remove than plugs.

OTHER PROBLEMS OF THE KIND SUBMITTED

Problems of this nature are frequently encountered in the running of pipes for heating systems, and pipes must get over, around, or under such obstructions, the method used in each case depending upon the contents of the pipe.

Thus, in a vacuum heating system, the vacuum pump removes air as well as condensate through the main return, so that obstructing water mains, beams, or doorways must be passed as shown in Figs. 3 and 4, carrying the water under, and the air over, the latter through a small air line. Again, in a one-pipe

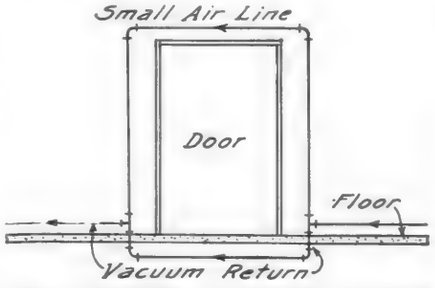


FIG. 4—METHOD OF PASSING VACUUM RETURN LINES AT BEAMS AND DOORWAYS.

steam system, where the condensate from radiators flows in the same pipe and counter to the flow of steam, any interference must be overcome as shown in Fig. 5, thus allowing the steam to flow over the girder while the condensate flows under the girder back to the same pipe.

HOW INTERFERENCES ARE OVERCOME IN WATER HEATING SYSTEMS

In a water heating system, conditions

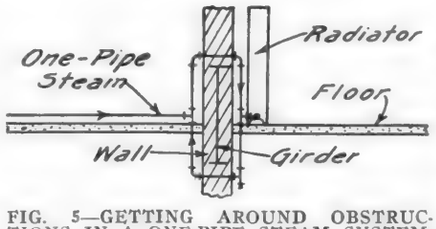


FIG. 5—GETTING AROUND OBSTRUCTIONS IN A ONE-PIPE STEAM SYSTEM.

are somewhat different, and where the flow and return mains are on the same level, they need only be dropped (Fig. 6), so as to pass under the girder and return to the original grade on the other side. This may be done without affecting the circulation, merely using an air vent at the high point of the flow, just before its depression.

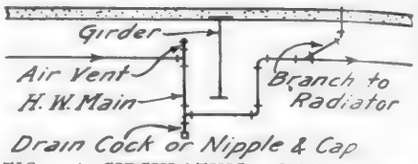


FIG. 6—CIRCULATING HOT WATER THROUGH A POCKET.

In like manner, hot water will circulate through any trap, such as the so-called "D" connection,—a depression made in a branch so as to pass under another pipe or obstruction. This connection (Fig. 7) is commonly used for hot water branches connecting from the

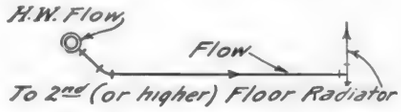


FIG. 7—"D" CONNECTION FOR RESTRICTING FLOW OF HOT WATER.

main nearest the heater to second or higher floor radiators, the object being, of course, to take the water from where it is coldest and thus prevent the first radiators from getting the best of the circulation.—T. W. REYNOLDS.

Some of the Reasons Why Engineers Fail As Contractors

So many engineers have failed as contractors that it is frequently predicted, upon hearing that an engineer has started into contracting, that he will fail, writes Daniel J. Hauer, a consulting engineer of Baltimore, in *The Architect and Engineer* for May. It would seem, judging from an engineer's training and experience, that an engineer would make an ideal contractor but this is not always the case.

"There are a number of reasons why the engineer, even of many years' experience, fails as a contractor" says Mr. Hauer. "In the principal essentials pertaining to a construction job the engineer is likely to plan better. The engineer generally fails in the numerous details. This is true of estimating on work as well as in carrying on the job.

"In details of estimating and managing work the engineer is inclined to be more theoretical than practical.

"An engineer also fails in many cases, due to a lack of experience in handling men. He is apt to employ too many men —which means excessive payrolls. He frequently has too large an office force, and too many assistants, many of whom are assigned to useless and needless tasks.

"There are other things and many of them that count against an engineer making a successful contractor, but one stands out prominently, namely, the egotism of most engineers. Few engineers can agree on any subject, even a mathematical formula, and each will hold that he is correct and the other fellow is wrong. Thus the average engineer in starting as a contractor, being versed in construction, is likely to think that he knows all that is worth knowing and that few if any contractors and engineers can instruct him in anything pertaining to construction or contract work. It is said, 'pride goeth before a fall,' and this has been true of

many engineers entering the contracting field."

To make a success of contracting Mr. Hauer points out the engineer should remember that while he may know engineering he knows little if anything regarding contracting, and while his engineering knowledge should prove an asset he must go to the school of experience to fit himself for his new work.

He can learn more regarding contracting by associating himself as a partner with a contractor who has had some years of successful experience or he can keep minute cost records of work he supervises as an engineer prior to entering the new field.

While there are no college courses on contracting there are a number of books on the subject making it possible for those desiring to do contracting to study the subject in this way.

Standard Code for the Testing of Centrifugal and Disc Fans

(Approved by the National Association of Fan Manufacturers and by the American Society of Heating and Ventilating Engineers.)

As the title implies, this code is intended to establish a standard method of testing centrifugal and disc fans, and to provide a uniform basis for compiling fan performance data. Among the points covered for the testing of centrifugal fans is the arrangement of the test duct which is to have an area equal to the fan discharge and to be not less than ten diameters in length. Readings are to be taken over a plane at right angles to and the Pitot tube shall be parallel to the axis of the duct with the impact end pointed upstream. The place where these readings are taken is to be three-quarters of the length of the test duct from the fan end.

The number of readings is specified for both round and rectangular ducts, while the standard instruments for measuring pressures are the double Pitot tube and the manometer. A cradle dynamometer is recommended for all power measurements.

Under inlet and outlet obstructions, it is specified that fan performances are to be based on unobstructed inlets and outlets except for the structural features of the fan involved in bearings and bearing supports. As to the number of determinations, it is provided that eight or more determinations are to be made covering a range of performance from approximately free delivery to no delivery.

The readings of total pressure, static pressure, velocity pressure, horsepower input and speed are covered, all of them being made simultaneously. Barometer and temperatures readings are also provided for, the temperature in the discharge duct to be taken as close as possible to the point of traverse. The speed is to be maintained as nearly constant as possible throughout the entire test.

TESTS OF EXHAUSTING FANS

In testing fans for exhaust pipe systems it is provided that the capacity shall be determined by readings taken in the discharge duct in the manner prescribed for centrifugal fans. To determine the total pressure there shall be provided an inlet duct having an area equal to the fan inlet and six diameters in length. The total head or total pressure is the difference between the average absolute total pressure in the discharge duct and the average absolute total pressure in the inlet duct, with additions to cover friction of inlet and outlet ducts between the points of measurement and the fan. The average absolute total pressure in the inlet duct is to be determined by adding to the absolute static pressure in the inlet duct the calculated average velocity pressure in the inlet duct. This total pressure in the inlet duct may also be obtained from the average traverse impact tube readings or more simply from the readings of impact tubes. Readings in the inlet duct are to be taken at a place three-quarters of the inlet duct length from the entering end. The static pressure developed by the fan is the difference between the total head thus obtained and the velocity head in the disc discharge duct.

DISC AND PROPELLER FAN TESTS.

The code on the testing of disc and propeller fans is framed on the basis of fans exhausting from a chamber, and all air readings are to be taken on the inlet side. As in the case of centrifugal fans, so with disc and propeller fans, the standard instruments for measuring pressures are to be the double Pitot tube and the manometer.

The test set-up for disc and propeller fans consists of an air-tight chamber of rectangular or drum form and of minimum size in proportion to the fan to be tested.

At the entrance side of the chamber is to be a duct 10 pipe diameters in length, which length includes a transformation piece to be carried to the full dimensions of the end chamber and provided with an effective diffuser.

By restriction at the inlet end of the test duct, the volumes handled are to be varied, and free delivery conditions must be procured by the use of an auxiliary blower for obtaining zero or above static pressures in the chamber.

The capacity of the fan is to be determined by readings taken in the test ducts at the place indicated and in the manner prescribed for centrifugal fan tests. The static pressure is to be determined by a reading of an impact tube in the large chamber. Tables based on the foregoing test shall be designated for wall installation without ducts.

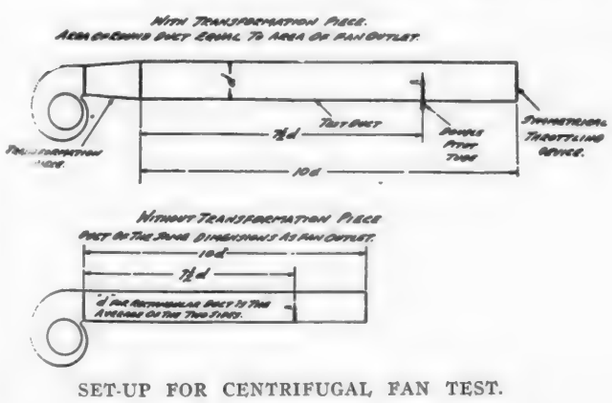
DISC FANS TESTED BLOWING.

When disc fans are used to blow into a pipe in actual service the performance is different from the performance when mounted in a wall, and consequent allowance should be made for the modified condition. Disc fans for blowing purposes are to be tested with the same standard arrangement of apparatus as described for those exhausting from a chamber, but in addition there must be placed on the discharge side of the fan a collar of the same diameter as the fan opening and one diameter long. Tables based on such tests shall be designated for installation with ducts.

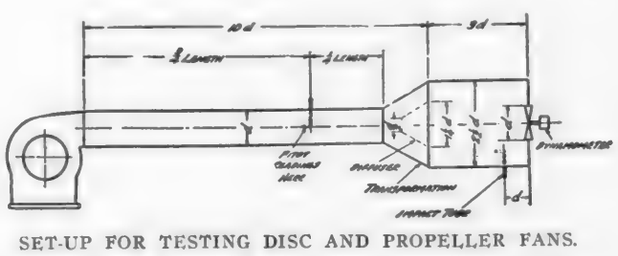
Any obstruction to the flow of air such as a driving motor, pulley, bearing, framing or the like, that forms part of the unit, whether normally on either the discharge or inlet side of the fan, shall be in its designated position so as to affect the test results to show the true performance of the fan as used in that unit.

The code is accompanied by an appendix containing the derivation of the formulas used, calculation sheets for centrifugal fans when blowing and when exhausting, and a calculation sheet for propeller fans.

WILLIAM P. WAUGH, consulting engineer for the H. H. Robertson Co., Pittsburgh, Pa., and known particularly through his development of skylights and the solution of ventilation problems of industrial plants and public buildings, died in Sewickley, Pa. He was located for many years in New York as sales manager New York sales manager for the James G. Wilson Mfg. Company.



SET-UP FOR CENTRIFUGAL FAN TEST.



SET-UP FOR TESTING DISC AND PROPELLER FANS.

Problems of Theatre Ventilation, With Notes on Advantages of Downward Air Flow

Among the schemes for ventilating a theatre building presented at a recent meeting of the Illinois Chapter of the A. S. H. & V. E., was one by E. P. Heckel of the Carrier Engineering Corporation.

As reported in *Power Plant Engineering* for April 15, this scheme dealt largely with the system of downward introduction of the air as opposed to the conventional mushroom method. He considered also quantities involved to secure certain desirable weather conditions. Quoting from the paper, the report continues:

Ventilation of the theatre, or any other enclosure, is in itself a comparatively simple problem, if you consider ventilation merely a matter of displacing theatre air with a large or small volume of outside air by mechanical means. The cooling of a theatre is also rather simple when incorporated with ventilation and when theatre temperatures (dry-bulb alone) are considered without respect to relative humidities or resultant wet-bulb temperatures, or when the economical operation of the theatre refrigeration and ventilation system is considered a matter of no real importance.

Broadly speaking, what is to be considered when we think of theatre ventilation and cooling? That subject in itself represents money spent for mechanical equipment for the assurance of the comfort of the patrons while in the theatre. I believe we should consider of paramount importance all of the following factors, any two of which, if omitted in such consideration, would not permit maximum comfort conditions commensurate with economy in the operation of such equipment. We like to think of theatre ventilation and cooling as comprising the following:

1. Maintaining dry-bulb temperatures in the theatre with some respect to outdoor temperatures.
2. Maintaining a uniform wet-bulb temperature with respect to the dry-bulb temperature.
3. Providing good air circulation, or air movement.
4. Providing proper air distribution to promote uniformity of air delivery without objectionable drafts and without subjecting the patrons to either warm or cold saturated air, to their discomfort.
5. Maintaining purity of air in circulation.

OBJECTIONS TO UPWARD VENTILATION THROUGH MUSHROOMS.

Some objectionable features of the conventional method of air distribution, namely, the mushroom method, might be enumerated as follows:

1. A system designed to deliver air directly underneath the seats from the cooling apparatus, whether it be from a spray type dehumidifier or bunker coils, without a recirculating air mixture or means of re-heating, proves objectionable in that saturated air delivered under the seats with temperatures that may range anywhere from 50 to 65 deg. during the refrigeration period.

2. Difficulty is involved in getting a uniform distribution of air delivery since low duct velocities are necessary in the supply and practically the only means for regulation or varying the quantity discharge by the different mushrooms is by the adjustment of the mushrooms themselves. In adjusting the mushrooms, varying the sizes of discharge openings, varies the velocities from the various mushrooms. Even though the volume of air may be varied, the results are obviously uncertain.

3. The mushroom delivery method has one objectionable feature which it may be considered important to eliminate. I question if any of us would refuse to recognize the fact that air delivered directly on the floor level in a horizontal plane, disturbs the floor dust and keeps it in more or less constant circulation.

4. With the mushroom delivery method, the temperature and humidity regulation is not as easily obtainable and positive as we believe it should be.

Air conditioning in the past has been directed largely to industrial lines where the requirements for definite and uniform temperature and humidity conditions are infinitely more exacting than with theatre cooling and ventilation, although relatively not more important. Why not profit from that experience? I believe I am correct in saying that in no case do we deliver air at floor level.

MUSHROOM EXHAUSTION ADVOCATED.

Of extreme importance, as I see it, is air distribution, but it is also necessary that the design of the apparatus be of proper proportion for specific temperatures and humidities with a simple yet positive means for control of both. I therefore prefer, wherever practical, the downward method of air delivery which reverses the conventional method of mushroom delivery to the method of mushroom exhaustion. The principal advantages of the overhead method, I believe, can be enumerated as follows:

1. Uniformity in air distribution as well as distribution of temperature and humidity, obviating objectionable drafts, which, by the overhead method, I believe, is more easily obtained.

2. The downward flow of air has the advantage of permitting the cool air delivered to be tempered before it reaches the breathing zone, and this air comes direct to the occupants.

3. It permits of flexibility in operation, whether one or more units are used, by splitting up the theatre into separate air delivery zones, as well as separate air exhaust zones, each zone being taken care of independent of the other.

4. If the rear of the house is unoccupied, the apparatus for that particular portion need not be in operation. This applies to any other portion of the house as well.

5. It permits closer regulation of temperatures and humidities, as the automatic regulators are then placed in the exhaust or return air duct which air temperatures will give the average breathing zone conditions which, after all, is what we are interested in.

A CASE IN POINT.

Let us assume that we want to hold the theatre conditions at 80° maximum temperature when outside is at a maximum of 95°. The theatre humidity conditions to be held at 55% relative humidity, with wet-bulb temperatures not exceeding 68°. This means a moisture content in theatre air of not more than 6.93 gr. per cubic foot, and which determines the dewpoint temperature of room air to be 62°. This fixes one condition and consideration that cannot be changed, and that is—regardless of the volume of air passed through the cooling apparatus and regardless of the type of cooling apparatus, that air passed through the cooling equipment must be cooled to at least a temperature of 62° before it is delivered to the theatre. Why? Because it is necessary, first, to fix the moisture content of the air so that when this air heats up to 80° (the theatre temperature selected), the moisture contained by the air will be 55% of the amount that air at 80° could hold, if saturated with moisture. Air at 80° if saturated, would hold 10.934 gr. per cubic foot. Since we want 55% relative humidity, the actual moisture contained in the 80° air must be 55% of 10.934 or 6.02 gr. To obtain this condition necessitates cooling the air and condensing out the excessive moisture contained in the entering air, down to 62°, at which saturated temperature, the air will hold only the requisite moisture necessary.

We are considering a 2,000-seat house. How much air is to be delivered? How much is to be cooled? We know that regardless of what volume we select, we must cool the air passing through the dehumidifier to at least 62°. Some say 25 c.f.m. per occupant, all from outdoors. This would mean 50,000 c.f.m. cooled to 62°. What does this mean in refrigeration load? What is the B.T.U. load to be absorbed from this air that is being cooled? What will be the resultant theatre conditions?

Heat to be absorbed in the theatre by the delivered air is 10,000 B.T.U. per minute with a full house (5 B.T.U. per minute per person). (Therefore—

10,000 B.T.U. × 56 ÷ 50,000 c.f.m. results in a rise in temperature to the delivered air of 11.2° in absorbing the liberated heat from occupants, walls, lights, etc. It can't rise any more unless we furnish additional heat from some other source. If we don't get this other heat, what is the result in the theatre? We first cooled to 62° (saturated)—that was necessary. The rise in air temperature in the room is only 11.2°. The theatre temperature will then be 62° plus 11.2° or 73.2°. What else have we? A relative humidity of 70% with a wet-bulb of 66°.

Is it not reasonable to believe that a temperature of 73.2° in the house, when outside is at a maximum of, say, 95°, is too low to be comfortable? Most of us would probably say the temperature would be more comfortable if the house were 80°. An additional 6.8° rise in temperature, with the same dewpoint, would

reduce the relative humidity to the 55% that we previously specified as desirable. The wet-bulb with 80° dry-bulb and the same 62° dewpoint would be 68°, or only 2° higher than at 73.2° room dry-bulb temperature.

THE REFRIGERATION REQUIRED.

Now, what about the refrigeration required?

50,000 c.f.m. ÷ 13.4 = 3735 lbs. air per min.

Total heat at 78° 40.5
Total heat at 62° 27.3

13.2 B.T.U. per pound

13.2 B.T.U. × 3735 = 49,250 B.T.U.
Pump 15 hp. × 42.5 = 637

Total 49,887 B.T.U.

To cool 50,000 c.f.m. from a maximum outside condition of 78° wet-bulb to 62° saturated, would require 250 tons of refrigeration.

Some of us will say that this is too much refrigeration for this 2,000-seat house. The fact remains, however, that if you have to cool 50,000 c.f.m. from maximum outside conditions to 62°, you can't get away from using 249.5 tons. If you use less refrigeration, you simply don't cool 50,000 c.f.m. to 62° under extreme maximum outside conditions, unless you wanted to use a heat interchanger, which is not the most practical thing for theatre work, and if you do not cool to at least 62° the air will contain more moisture and will result in a higher relative humidity and higher wet-bulb temperature than we are considering.

How can we avoid this high refrigeration load, as well as the heating necessary at the same time and still be able to say that the theatre temperature will not exceed 80° on the hottest day of the summer, and the relative humidity and wet-bulb will not exceed 55% and 68° respectively, regardless of outside maximum conditions.

It is nothing short of wasteful to spend money and equipment and power for its operation, to cool air and condense moisture from large volumes of air, and then, exhausting it immediately to outdoors. Why not recirculate a portion of it at least? This procedure, I cannot believe, promotes the hazardous condition, resulting in all sorts of ailments and sicknesses to mankind, that some few in the past have tried to make us believe, but I do know that it does promote economy in plant equipment, size and operation, and gives the desired temperature and humidity conditions as well as air movement in the theatre for comfort.

THE SAME PROBLEM CONSIDERED WITH PARTIALLY RECIRCULATED AIR.

Considering the same theatre temperature and humidity desired as heretofore, let us see what happens if we use a total fan capacity of 60,000 c.f.m. dehumidifying and cooling 40% and recirculating 60 per cent. Since we are now recirculating some air, we must cool the outside air taken in, to a lower dewpoint or saturated temperature to compensate for moisture given off by the theatre occupants. Calculations indicate we must cool to 57°. This cooled air, mixed with recirculated air at 80° gives us a temperature of mixture of 70.65°. This, then, would be the delivery temperature to theatre. In taking up the heat given off by theatre occupants, lights walls, etc., this 60,000 c.f.m. of air delivered will rise 9.35°, giving 80° as the final breathing zone, exhaust or recirculated air temperature.

Refrigeration required to maintain the theatre temperatures would not exceed 150 tons with this arrangement. A comparison of figures shows:

This represents a saving of 100 tons of refrigeration. Assuming for a moment the power consumption of 1 hp. per ton of refrigeration, in each case it also represents a total of 100 hp. saved. Assuming 2 gal. of water required per ton of work done for condensing purposes would indicate a saving of 200 gal. of condensing water in favor of a system embodying recirculation. Allowing the same temperature water rise in the spray cooling system in either case, indicates a saving in the quantity of spray water necessary, in favor of the recirculating system of over 240 gal. of water. Since this water is recirculated the saving by the reduced quantity of water necessary amounts to about 10 hp. in the motor for the pump. Is not the 100-ton reduction in refrigeration size, 100 hp. reduced operating cost, 200 gal. per min. of condensing water and the 10 hp. reduction in pump motor size well worth considering?

I am inclined to believe that I would advocate the downward method of air delivery whenever conditions permit. Often, the owners and the architects have already proceeded with the mushroom method of air delivery in mind, and the architects' layout is too far along to permit changing this method. Then the same recirculation idea could be followed out with the mushroom method of air delivery as with the downward method. In compromising (and engineering is full of that) this will give you some idea of the disadvantages set forth above, but will also embody some of the advantages considered possible by the downward method, due to the recirculation of air.

National District Heating Association

Program for Annual Meeting.

Following is the program for the fourteenth annual convention of the National District Heating Association, at the Breakers Hotel, Cedar Point, O., June 21-23:

WEDNESDAY, JUNE 20, AFTERNOON.

President's address.
Reports of secretary-treasurer, technical secretary and executive committee.
Report of Rules and Regulations Committee, R. A. Heitbrink, chairman.
Report of Educational Committee, J. H. Walker, chairman.
Appointment of Nominating and Convention Committees.

WEDNESDAY, JUNE 20, AFTERNOON.

Report of Station Operating Committee, R. D. DeWolf, chairman.
Address by C. F. Hirshfeld, chief of Research Department, Detroit Edison Company.
Paper—Powdered Fuel and Symposium on its Results.
Report of Nominating Committee.

THURSDAY, JUNE 21, MORNING.

Report of Heating Research Committee, H. T. Luscomb, chairman.
Report of Heat Utilization Committee, O. W. Kastens, chairman.

THURSDAY, JUNE 21, AFTERNOON.

No professional session.

FRIDAY, JUNE 22, MORNING.

Report of Public Policy Committee, C. O. B. Murphy, chairman.
Report of Rate Committee, L. E. Young, chairman.
Address—Public Relations as a Factor in Public Regulation, by Grover C. Maxwell, Columbus, O.

FRIDAY, JUNE 22, AFTERNOON.

Round table on new appliances.
Report of Hot Water Committee, E. H. Enander, chairman.
Report of Distribution Committee, N. W. Calvert, chairman.
Election of officers.

SATURDAY, JUNE 23, MORNING.

Report of Operating Statistics Committee, F. B. Orr, chairman.
Report of Meters and Accessories Committee, J. C. Butler, chairman.

Co-Operation Urged of National District Heating Association with Department of Commerce.

In a letter sent out by Herbert Hoover, Secretary of Commerce, under date of April 11, 1923, to the secretary of the National District Heating Association, co-operation is asked in connection with the coal supply for next winter and the expedition of railroad shipments generally.

"Due to the war" states Mr. Hoover, "and the long-continued impossibility on the part of the railways to finance the necessary betterments, both our production capacity and consuming demands have now advanced beyond our transportation facilities." The trades, he adds, can make a tremendous contribution to the orderly march of our prosperity if they will undertake a systematic method of co-operation.

The principal direction in which such co-operation can be extended by the trades is given as:

1. The advance storage of their winter coal during the light consuming season—that is, from now until September 1, including the early movement of Lake traffic.

2. The loading of cars to full capacity, their prompt loading and discharge.

3. Reduction of reconsignment shipments and restriction of to-order bills of lading.

4. Demands for no more cars from the railways than can be promptly used.

Manufacturers of Steam Fittings and Steam and Water Heating Apparatus in 1921

The Department of Commerce announces that according to reports made to the Bureau of the Census the value of products of establishments engaged primarily in the manufacture of steam fittings and steam and water heating apparatus amounted to $127,367,000 in 1921, as compared with $160,285,000 in 1919, and $63,922,000 in 1914, a decrease of 21% from 1919 to 1921, but an increase of 99% for the seven-year period 1914 to 1921.

In February, the month of maximum employments, 34,667 wage earners were reported, and in August, the month of minimum employment, 27,432—the minimum representing 79% of the maximum. The average number employed during 1921 was 30,808, as compared with 36,686 in 1919 and 26,388 in 1914.

The figures for 1921 are preliminary and subject to such change and correction as may be found necessary from a further examination of the original reports.

The statistics for 1921, 1919, and 1915 are summarized in the following statement:

	1921[1]	1919[1]	1914[1]
Number of establishments	274	249	263
Persons engaged	37,086	43,864	31,745
Proprietors and firm members	82	73	110
Salaried employees	6,196	7,105	5,250
Wage earners (average number)	30,808	36,656	26,388
Salaries and wages	$54,285,000	$58,204,000	$24,417,000
Salaries	14,689,000	12,461,000	7,679,000
Wages	39,596,000	45,743,000	16,738,000
Contract Work	124,000	40,000	179,000
Cost of materials	50,213,000	72,016,000	26,921,000
Value of products	127,367,000	160,285,000	63,922,000
Value added by manufacturer[2]	77,154,000	88,269,000	37,001,000

[1]Statistics for establishments with products valued at less than $5,000 are not included in the figures for 1921. There were 20 establishments of this class reporting 19 wage earners, and products valued at $54,000. For 1919, however, data for 12 establishments of this class, reporting 7 wage earners, and products valued at $27,000, and for 1914, data for 32 such establishments, with 34 wage earners and products to the value of $91,000, are included in all items with the exception of "number of establishments."

[2]Value of products less cost of materials.

Simplification Program May Affect Heating and Ventilating Appliances

The first analysis of findings in the survey of simplification opportunities conducted by the American Engineering Standards Committee at the request of Secretary of Commerce Hoover, shows many suggestions of interest to manufacturers of heating and ventilating appliances. The report covers what the committee believes to be more than 1,000 outstanding opportunities for the elimination of economic waste through simplification of varieties and sizes of products in the automotive and building industries, machine shop, electrical industry, paper and printing, power, railroad and miscellaneous industries.

Products specifically suggested in the power division include: cast-iron heating boilers, water-tube boilers, boiler horse power rating, boiler fittings, pipe covering, pipe hangers, valves (all sorts), steam traps, injectors and steam separators, and fans and blowers.

These suggestions resulted from a questionnaire sent out by the American Society of Mechanical Engineers, and called for recommendations as to three distinct types of simplification opportunities: finished products in which the number of lines could be reduced; finished products in which the varieties in each line could be reduced in number; and raw materials of construction or of manufacture which may be reduced in the number of varieties or kinds.

Wisconsin Heating and Piping Contractors' Association Holds Twelfth Annual Convention.

An increase of 50% in its membership and the adoption of an aggressive policy for 1923 were the features of the twelfth annual convention of the Heating and Piping Contractors' Wisconsin Association, held in Milwaukee, April 16. A large part of the credit for this showing is given to Edward J. Sullivan, president of the Wisconsin State Association, who was re-elected, as were the other officers, including: vice-president, George H. Kallies, Manitowoc; secretary-treasurer, Joseph H. Volk, Milwaukee; sergeant-at-arms, Otto Biefeld, Watertown; board of directors: Edmund Grassler, Paul E. Mueller and M. E. Flaherty, of Milwaukee; J. B. Sullivan, Stevens Point, F. H. Meadows, Milwaukee, and A. H. Thomas, Racine.

John S. Jung, president of the Milwaukee association, addressed the convention, emphasizing the need of improved business methods. Other speakers were Frank H. Meadows, who talked convincingly of the value of trade associations to the trade; M. E. Flaherty, the first president of the association; and George F. Reeke, of Green Bay.

A report was also presented of the work accomplished by the Milwaukee Association's Boiler and Radiator Standards Committee and advisory committee in standardizing methods of figuring radiation, boiler capacities and pipe sizes. Special attention was directed to the ample capacities required for boilers in the standards formulated by the two committees.

The convention closed with a banquet at the Blake Hotel, at which the principal speakers were George M. Getschow, president of the Heating and Piping Contractors' National Association, Charles Glennon, president of the Chicago association, and Louis T. Brann, executive secretary of the Chicago association.

Secretary Hoover's Recommendations For "Holding on to Prosperity."

Secretary of Commerce Herbert Hoover outlined the essential economic differences between the present period and that in 1920, and while praising caution, stressed also the need for confidence and courage at this time, in a recent address before the Chamber of Commerce of the United States in New York.

The broader and deeper essentials involved in the planning of commerce and industry to keep the nation permanently prosperous constituted the major theme of his address.

"There are very definite differences," he said, "in our present economic position in the business cycle as compared with the situation prior to the collapse in 1920. The government index shows wholesale prices are to-day about 30 per cent. below the crest at that time. This index shows an increase in wholesale prices of 6 per cent. in the last nine months, contrasted with a rise of 20 per cent. in the nine months prior to the collapse in the 1920 boom.

"Increases in price are a necessary accompaniment of business recovery. They are the vital stimulant to production. They do not mean inflation unless they continue to rise after full production is attained or unless they are the result of speculation. We have been steadily increasing our production for the last 18 months. Yet in the two years prior to the 1920 collapse there was comparatively little increase in production. Beyond this again we have had a very stable cost of living for over a year.

"We have no need to go into a period of inflation. We are undoubtedly in a plane of prosperity and we wish to hang on to prosperity. I am not one of those who believe that hard times have any special advantage in disciplining our souls. We ought to be able to discipline ourselves in prosperity when we have time to do it and having achieved prosperity, we ought to be able to hold on to it.

"We must get our minds away from the notion that pre-war standards of living and volume of business would be normal now. Normalcy is a vastly higher and more comfortable standard than 1913. We must not judge the state of business activity by pre-war figures, but by a hugely increased base. We must not be frightened when our output of steel or textiles or automobiles, lumber, corn or hogs, or our car loadings amount to figures far in excess of those that would be implied alone in a normal growth of population."

PLAN TO CURB RISING COSTS

After referring to the great need of building which he said was required not only to meet the normal growth of the country but also to make up the long overdue and accumulated deficit Mr.

Hoover explained his recent recommendations to curb rising costs in the building industry.

"I recently made a recommendation," he said, "that we defer all but the essential government works and public buildings as much as possible so as to give full swing to private construction. A representative and able commission of business men and labor which I requested to examine this question goes farther and recommends that we should do all our public works in times of depression and thereby provide greater continuity of employment and contribute to plane out the valleys of depression and level the peaks of booms. This deferment of public construction is more important now than ever for we need the full use of labor and material for long overdue private construction. We wish no cessation in this prime necessity. This recommendation received commendation from hundreds of manufacturers, from labor organizations, and contractors and the press. The inevitable criticism came from such a minority as to be negligible. Its reception is evidence of the enlightened and constructive thought of our manufacturers who look to the long run of prosperity rather than to the joys of short-lived booms. It would be very helpful if such a policy of construction reserve could be well established by states and municipalities as well as the federal government."

"If we would expand our manufactures to replace the inevitable comparative decrease in agricultural produce we shall need to increase still further our industrial and commercial efficiency. We have a large field yet for the elimination of waste, in the still greater improvement and simplification of business methods, in the increase in arbitration of commercial disputes, in the planing out of the business cycle, in the reduction of intermittent operation of industry, in improvements in our internal transportation, in the maintenance of our institutions, of economic and scientific research, in the training of technologists, in better commercial strategy and in a score of other directions."

Warm-Air Furnace Manufacturers to Undertake New Publicity Work

Some idea of the extent of the forward movement planned by the manufacturers of warm-air furnaces is given in the resolution adopted toward the close of the recent convention of the National Warm Air Heating and Ventilating Association, in Cleveland, providing for the establishment of a publicity bureau. The plans will be developed by a committee of three to be known as the Committee on Publicity and Trade Practice of the National Warm Air Heating and Ventilating Association. The movement was considered one of the most important acts of the convention. Those appointed to serve on this committee are John P. Wagner, president of the Success Heater & Mfg. Co., Des Moines, Ia., who introduced the resolution, Roy C. Walker and Charles Seelbach, Jr. Following is the full text of the resolution as adopted:

"Whereas, the National Warm Air Heating and Ventilating Association fully realizes the superiority of warm-air heating when properly made, installed and operated, and,

"Whereas, the relationship between manufacturer, dealer and customer are vital and necessary to obtain the best results in reflecting the highest degree of economy, health and comfort, and,

"Whereas, the research work of the association conducted by Professor Willard and staff at the University of Illinois has stimulated a nation-wide interest in universities, colleges, medical societies and health departments of many cities, all of which has promoted a universal demand for better heating and ventilating, and,

"Whereas, a number of manufacturers, members of this association, have undertaken, through individual effort and expense, to educate the public into a knowledge of better warm air heating and ventilating and its advantages as an air conditioning medium of preferred advantage, and,

"Whereas, the necessity for educational propaganda is an outstanding need for the uplift and advancement of the warm air heating and ventilating industry, and,

"Whereas, the best interests of all concerned can be most effectively and economically served by a concerted cooperative association effort by the National Warm Air Heating and Ventilating Association in conducting a nation-wide educational campaign, thereby establishing the highest degree of confidence and lasting benefits to the industry as a whole.

"Be it therefore resolved, that this association assembled in tenth annual convention at Cleveland, Ohio, April 18 and 19, 1923, at this time, take definite action to create a committee consisting of three members to be appointed by the president.

"That such committee shall establish and conduct a bureau to be known as Bureau of Publicity and Trade Practice of the National Warm Air Heating and Ventilating Association.

"That such committee shall supervise and conduct the affairs of such bureau and at all times function in strict accord with the fundamentals and principles of this association and safeguard its integrity and promote the best interests of the warm air heating industry, and that this convention set a date for a meeting within six months from date to act upon the report and recommendations of such committee."

In the annual report of Secretary Allen W. Williams, mention is made of the fact that the association was asked to contribute to the warm air heating section of the 1923 Guide of the American Society of Heating and Ventilating Engineers. Copies of the standard code for installing warm air furnaces in residences was offered as the best matter the association could furnish at this time for publication. It will be recalled that this code is the one which was adopted by several organizations representing the warm-air furnace industry, but did not, at the time, receive the approval of the A. S. E. & V. E. On this point Secretary Williams stated:

"If we were more or less disappointed in not receiving the complete endorsement of the code by the American Society of Heating and Ventilating Engineers, we must admit they have and are giving it much consideration."

Referring to oil as a furnace fuel, Secretary Williams stated that "the use of oil as a fuel in warm-air heaters has not been particularly attractive, so far as an economy or as a substitute for coal, but the high price of coal, the frequent coal strikes of miners and frequent transportation difficulties make its use look attractive, and there seems to be a tendency towards improvements in appliances for burning oil in warm-air furnaces."

UNFAVORABLE LEGISLATION PROPOSED IN OHIO

The legislative committee, in its report, referred to the legislation proposed in Ohio contemplating that all heating devices, including all types of warm-air furnaces, must be sent to the Ohio State University for approval before they could be offered for sale or distribution. The bill was sponsored by the Ohio State Board of Health on account of the large number of deaths from carbon monoxide that were occurring in Ohio. "Our committee," states the report, "was represented at the hearing which had not progressed very far before warm-air furnaces and other heating apparatus, with the exception of gas stoves, were eliminated from the provisions of the bill."

Regarding the proposed Wisconsin code covering heating and ventilating, the report states:

In Wisconsin, after an advisory committee had unselfishly put a great deal of effort into the drafting of a proposed code on heating and ventilating, their work was laid aside, and the Industrial Commission arbitrarily substituted a code drafted by themselves. When this tentative code was printed and circulated, the advisory committee had the following clause rubber stamped on the cover: "The advisory committee does not fully concur and want your criticism." Public hearings were held in four cities and the committee's representative in that territory was present at the Milwaukee hearing. The criticism was so strong in opposition to the code that the advisory committee has again been called into being, and it is hoped that their recommendations will be embodied in a new tentative code.

One of the features of the convention was a joint report by A. C. Willard, A. P. Kratz and V. S. Day, director and assistant directors, respectively of the warm-air furnace research work at the University of Illinois, on their work to date. They were later given a rising vote of thanks as a mark of appreciation of the results accomplished. Dean F. Paul Anderson, director of the Research Laboratory of the A. S. H. & V. E., was also present and

told of the work being done at the laboratory.

Among the papers presented was one on "Merits of Warm-Air Heating Apparatus When Properly Installed," by Professor E. A. Stewart, of the University of Minnesota, and one on "Fans as Applied to Warm-Air Heating," by R. W. Menk.

Upon recommendation of the executive committee, the association voted to continue the research work at the University of Illinois, the approximate subscription for the coming year being $5,500.

New officers were elected as follows:

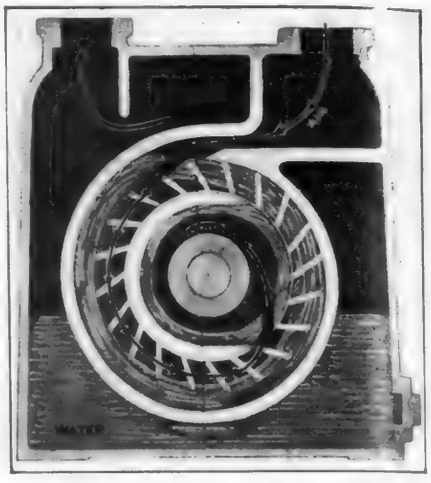
President—E. B. Langenberg, St. Louis.

Vice-President—Edward Norris, Utica, New York.

Treasurer—W. P. Cooke, Monroe, Michigan.

Secretary—Allen W. Williams, Columbus, Ohio.

Executive Committee—I. L. Jones, Utica; W. H. Hill, Elyria, Ohio; John Fry, Detroit; John V. Patten, Sycamore, Illinois, and H. Burnison, Toronto, Canada.



CONSTRUCTION OF NEW TRANE VACUUM PUMP.

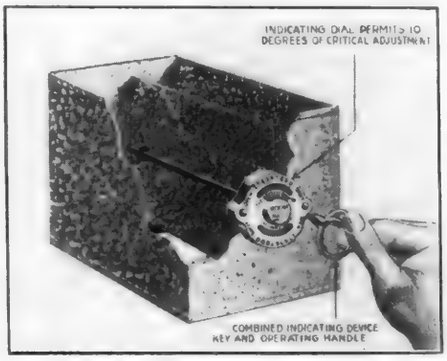
New Apparatus and Appliances

A Damper Regulator with Unusual Features.

A damper regulator designed to make positive the control of air passing through ventilating or heating ducts has been recently designed and placed on the market by The Dalzell Co., 21 Holmes St. Youngstown, O., under the name of the Surelock damper regulator.

As shown in the accompanying illustration, care has been taken to simplify the construction so as to allow of easy operation. To control the flow of air to any room or section, a double-lugged key is inserted in the lock holes and turned to the desired point. The damper is then automatically locked.

The fact that this regulator is automatically locked in any position when once turned permits it to be placed at any angle from perpendicular to horizontal. At the same time the locking feature prevents it from being tampered with by unauthorized positions.



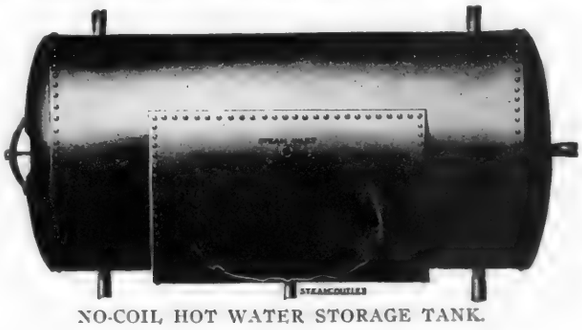
"SURELOCK" DAMPER REGULATOR.

The damper, it is stated, cannot be jarred out of the position in which it was last set. This is mentioned as an added advantage when the regulator is installed in buildings subject to constant jarring from street or railroad traffic. One size regulator will fit all sizes of pipe. It is made of "non-rusting" cast aluminum.

A Hot Water Storage Tank with Steam Jacket in Place of Pipe Coils.

An interesting type of hot water storage tank, placed on the market by the National Steel Tank & Mfg. Co., Bradford, Ill., is notable for the fact that instead of pipe coils it has a steam jacket which provides the necessary heating surface. It is manufactured under the name of the National No-Coil hot water storage tank.

The tank is intended to be installed in a horizontal position. By eliminating the use of pipe coils the point is made that leaks from that source are avoided. The steam jacket is constructed of the same weight of material as the tank, which is emphasized as insuring durability. In addition the longitudinal seams are double-riveted and the heads flanged and dished. A manhole is furnished in the head of the tank. Hydrostatic tests pressures of 150 lbs. are applied to the tank and the guaranteed working pressure is 100 lbs.



NO-COIL HOT WATER STORAGE TANK.

The full line includes 17 sizes, ranging in capacity from 100 gal. to 1300 gal. and ranging from 24 in. in diameter and 4 ft. long to 48 in. in diameter and 14 ft. long.

The New Trane Vacuum Pump.

Announcement is made by the Trane Co., La Crosse, Wis., of the perfecting of the new Trane non-reciprocating vacuum pump which has been under development for the past four years. This Trane unit is described as a new type of vacuum pump. It has but one moving part and is featured as absolutely non-reciprocating. The flow of air is through the impeller buckets in a straight line, entering the top and leaving at the bottom once only in each revolution. In this respect the pump is a radical departure from the single-impeller water-piston type.

It will be noticed from the accompanying illustration that the impeller which is the only moving part, has laterally-projecting vanes which form buckets on each side. This renders the impeller symmetrical and to that extent indifferent to end thrust and other forces encountered in operation. At any instant during operation the buckets approaching the block-off are full of water. Those just past the block-off have been cleared of water, due to centrifugal force, and the voids created in them have become filled with air and gases drawn through the film of water from the air intake. As will be noted, the air enters the top of the bucket.

From this point the impeller chamber gradually narrows, forcing water back into the buckets, sealing the air and placing it under an increasing pressure until it passes the air outlet point, where it is released to atmosphere through a central chamber in the pump. The air leaves through the bottom of the bucket, the air outlet being merely an opening in the inner ring upon which the impeller loosely revolves.

For air-line systems the new pump is furnished direct-connected with motor, mounted on cast-iron sub-base. As arranged for return lines, the single return-line pump of smallest size has a capacity of 6,000 sq. ft. against 10 lbs. boiler pressure. It is operated by a ¾-H. P. motor. To allow the adaptation of these units to the wide range of capacities and pressure required in heating work, the air and water pumps are in separate bodies, but mounted on one sub-base and direct-connected to one motor. They can also be furnished in two-unit type, that is, separate motor for the air pump and a separate motor for the condensation pump, if desired. All units are furnished with or without vacuum and float control, and auxiliary starters are furnished when desired.

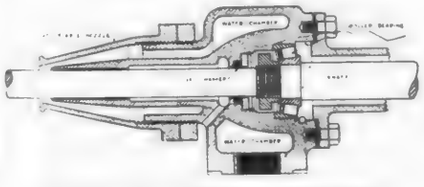
Where it is desired to remodel jobs which now use condensation pumps, states the company, the new Trane air pump can be supplied separately.

New Trade Publications

When Men Build for Permanence is the title of a folder issued by the International Heater Co., Utica, N. Y. commenting upon the selection of Internationl Economy smokeless boilers for the Hide and Leather Building, New York, The Westinghouse and The Great Atlantic and Pacific Tea Company Buildings, Philadelphia; and the Buffalo Meter Building.

Fresh Air Means Working Energy is the argument presented in a folder issued by the Autovent Fan & Blower Co., Chicago, Ill., for the use of Autovent fans, Uniblade blowers and Autovent window ventilators in offices, plants, shops, assembly halls and homes. The point is illustrated by a three-fan installation in a laundry and an impressive list is included of some 52 representative buildings with Autovent equipment.

Bayley Turbo-Atomizer and the Bayley Air Washer and Air Conditioner, for cleaning, cooling, tempering, humidifying and dehumidifying air, are discussed at length in a new catalogue (Bulletin No. 25) published by the Bayley Mfg. Co., Milwaukee, Wis. The bulletin gives an interesting account of the development of the Bayley Turbo-Atomizer by E. M. Bassler, vice-president and chief engineer of the company, the statement being made that one single Bayley Turbo-Atomizer at low water pressure is capable of doing the work of 100 ordinary spray nozzles at



THE BAYLEY TURBO-ATOMIZER.

high pressure. One of the applications described of this device is the tandem arrangement for dehumidifying and cooling below the wet-bulb temperature of the incoming air, by means of refrigeration or cold water. The complete equipment is furnished in standard sizes, with capacities from 4500 to 110,000 cu. ft. of air per minute. It includes a Turbo-Atomizer, enclosed within a casing through which air is drawn by means of a Plexiform fan. The spray is distributed obliquely to the flow of air. Included in the bulletin are detailed descriptions of the various component parts making up the unit, and of complete structural details. In addition to full data for Types A and B, several pages at the back of the bulletin are devoted to typical installations to meet a variety of problems. Size 7¾-in. x 10½in.

Weather Vein, Vol. 3, No. 3 the periodical of the Carrier Engineering Corporation, Newark, N. J., features the use of Carrier ejector dryers for drying sanitary wares at the plant of the Kalamazoo Sanitary Mfg. Company. By this process, it is stated, the time of drying has been reduced from 17 days and over to about 24 hours in the racks and 18 hours additional in the dryers. Where the company formerly kept nearly 10,000 pieces in process, this number is now 2,600, representing an increase of 125% in capacity and a decrease of 74% of stock in process.

Test of Culm-Burn Grate.

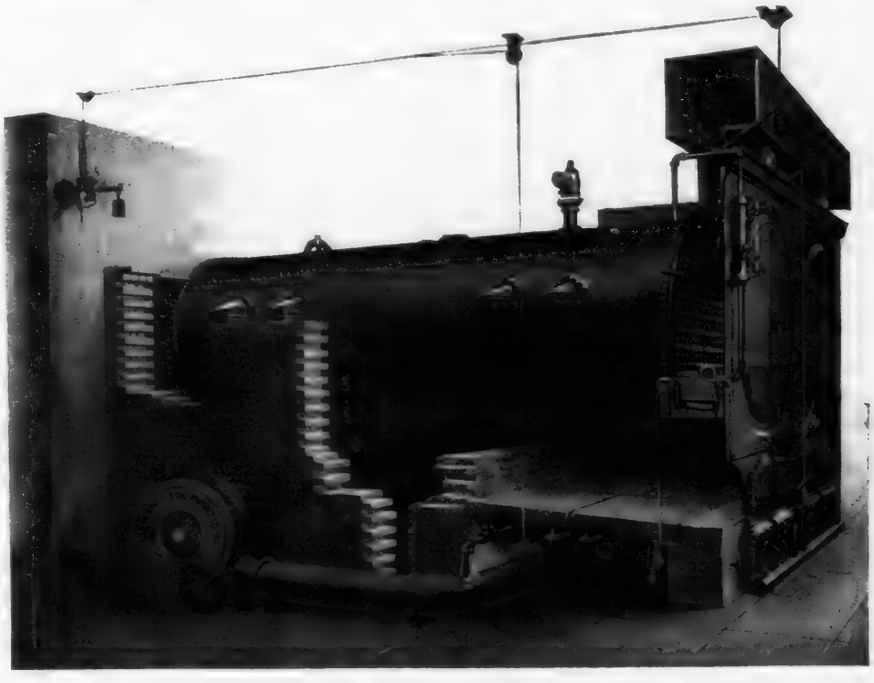
In connection with the description, published in the March issue, of the Culm-Burn grate which is designed to burn all kinds of low-grade fuels some interesting tests are reported of this equipment run at the Biberman Building, 15th and Mt Vernon Sts., Philadelphia, by F. F. Kauffmann, a consulting engineer.

Three tests were made when burning barley coal. In the first two the regular firemen operated the equipment and in the third the equipment was operated by employees of the manufacturer, the Culm-Burn Equipment Co., of Philadelphia. In submitting these tests the manufacturer points out the high boiler efficiency and the high evaporation secured.

The grate surface was 5 ft. wide and 6 ft. long, giving an area of 30 sq. ft. The total heating surface of the boiler, which was of the Ames Empire tubular portable type, was 1432 sq. ft. Following are the principal data of the tests:

Kind and size of coal used, anthracite No. 3 buckwheat, clean.

Dates of test	Jan. 26	Jan. 27	Jan. 31
Duration, hrs.	8	7	7 ½
Steam pressure gauge, lbs. sq. in.	1.69	0	1.18
Temperature of feed water entering boiler, deg. F.	179	143	148
Percentage of moisture in steam,	0.13	0.13	0.13
Percentage of moisture in coal	8.87	8.87	8.87
Dry coal per hour, lbs.	444.2	338.6	291.7
Dry coal per square foot of grate surface per hr., lbs.	14.81	11.29	9.72
hour, lbs.	14.81	11.29	9.72
Equivalent evaporation per hour from and at 212° F. lbs.	3540	2695	2848
Equivalent evaporation per hour from and at 212° F. per square foot heating surface, lbs.	2.471	1.881	1.988
Rated capacity per hour from and at 212° F., lbs.	4312	4312	4312
Percentage of rated capacity developed	82.1	62.5	66
Equivalent evaporation from and at 212° per pound of dry coal, lbs.	7.96	7.96	9.76
Equivalent evaporation from and at 212° per pound of combustible, lbs.	10.18	10.17	12.46
Calorific value of 1 lb. dry coal by calorimeter, B. T. U.	11970	11970	11970
Calorific value of 1 lb. combustible by calorimeter, B. T. U.	14000	14000	14000
Efficiency—furnace and grate, per cent.	64.5	64.5	79.1
Efficiency based on combustible, per cent.	70.5	70.5	86.4
Cost to evaporate 1000 lbs. of water, dollars	0.36	0.36	0.29
Cost of coal per ton of 2240 lbs. delivered in boiler room, dollars	5.75	5.75	5.75
Saving, per cent	——	——	60



TYPICAL INSTALLATION OF CULM-BURN GRATE.

Improvement Continues Steady

Lower Profit Margin Apparently Permanent—Good Outlook for Summer

Especially prepared for THE HEATING AND VENTILATING MAGAZINE

By L. W. Alwyn-Schmidt

There are no established rules of testing the strength of an economic wave and it is difficult, therefore, to compare the present economic advance with similar advances of former years. In each former instance has been a more or less rapid increase of the volume of business, followed by a period of comparative stability at the crest of the wave, and a sudden decline at the end. The force of the movement and its effects upon the business life of the nation do not depend upon the actual height of the wave but rather upon the length of time which a remarkable underlying strength which supports the market in the face even of many disturbing factors. We have held from the beginning that there was no danger from sudden inflation and our very conservative appreciation of the situation is now supported by so reliable a source as the reports of the National Reserve Banks.

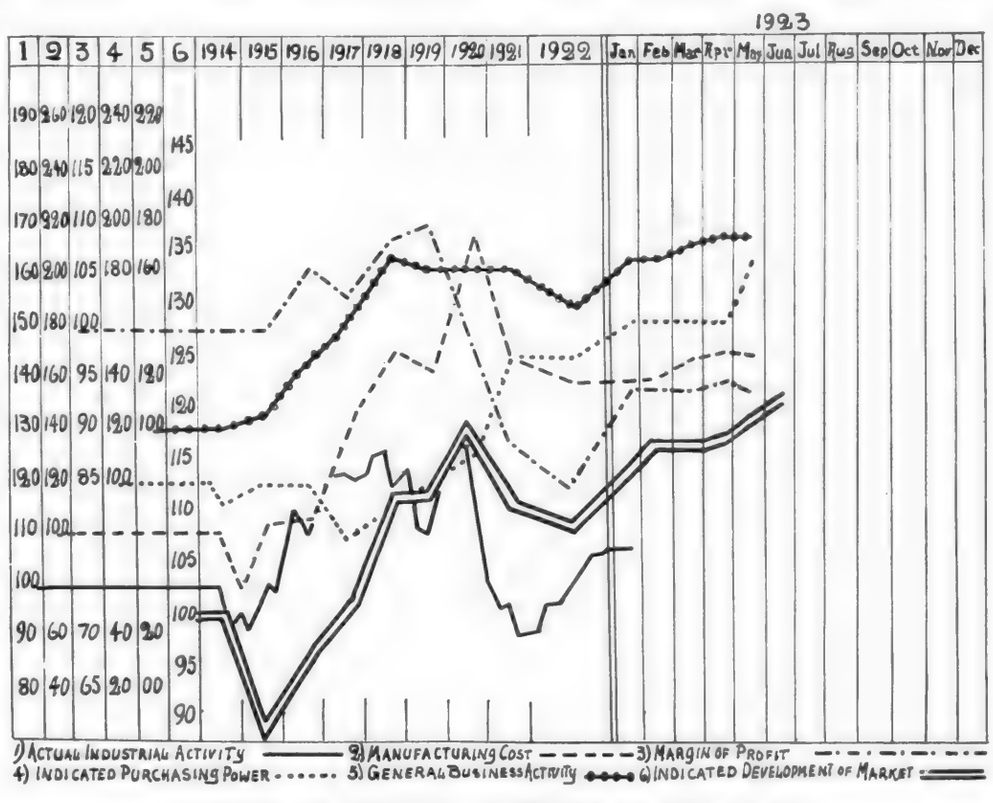
Any unsound tendency that may have existed during the early part of the year has been checked.

The nation's industrial activities are still growing but the growth, as indicated by employment statistics, is following rather the demand for industrial supplies then preceding it. Expansion where it takes place is the result of larger consumption and not of speculation, and jobbers have wisely abstained from placing anticipating orders and the markets are running on a narrow margin only between consumption and production. In ordinary times this situation might give some cause for concern. Just now, however, it seems that the policy adopted by our manufacturers will secure the best equilibrium of production and consumption, giving manufacturers a chance for a rapid adjustment in case there should be a sudden drop in orders. As it is, factories are sure to run all through the year on present working schedules with a chance for further increases as the volume of business grows.

Manufacturers, distributors and consumers alike must be cautioned not to set too much value in sensational press reports, which easily create a distorted view of the actual price condition of the markets. Facts just now point rather to a decline in production cost with a tendency of giving the consumer the benefit of the resulting savings.

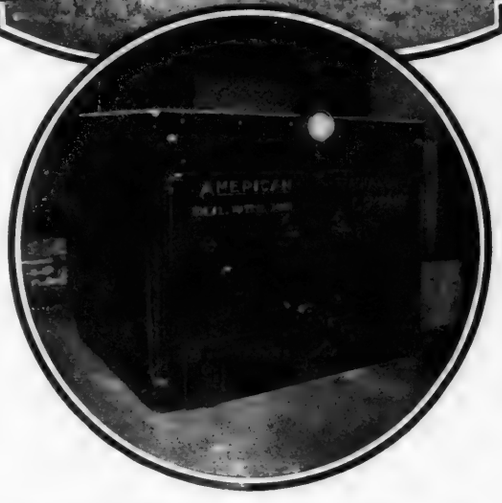
Manufacturing profits remain, on the national average, several points below those of the pre-war period. But experience only can show whether they will continue to do so.

The outlook appears exceptionally good but the present industrial equipment should prove sufficient to take care of any further increase of the nation's business.—*Copyright, 1923, by L. W. Alwyn-Schmidt.*


1923
1 2 3 4 5 6 1914 1915 1916 1917 1918 1919 1920 1921 1922 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1) Actual Industrial Activity
2) Manufacturing Cost
3) Margin of Profit
4) Indicated Purchasing Power
5) General Business Activity
6) Indicated Development of Market

ANALYSIS OF BUSINESS CONDITIONS AT END OF MAY.

"Antioch College, Yellow Springs, Ohio, which is warmed by a single IDEAL 79" Water Tube Boiler. 11,000 eet of radiation are attached to this low pressure, sectional boiler, which furnishes steam for domestic hot water as well. Price Brothers Construction Co. of Dayton, O., installed the boiler. The architect was Prof. Grandgent of the college."



For central heating plants— Low Pressure Boilers

A YEAR AGO the officials of Antioch College took out their worn-out heating plant, and installed a single modern IDEAL 79" Water Tube Sectional Boiler.

After a winter of real service the Dean o the college, Phillip C. Nash, wrote:

"Your IDEAL 79" Water Tube Boiler is the only heating unit of our central heating plant. It warms the two dormitories, each of ninety rooms; the main college building of twenty-seven rooms; the assembly hall and the gymnasium. Steam is also furnished by it for heating all the hot water used at the college.

"The boiler is giving such excellent service that we shall install another unit of the same kind when we add other buildings."

Saving fuel is but one of many advantages of the IDEAL 79" Boiler. Its unusual construction, fire tests, capacity charts, and many other interesting points, have all been condensed into an attractive booklet which every Architect and Heating Engineer should have.

Send for it to either address below. Your name on your letter-head will bring it.

AMERICAN RADIATOR COMPANY

IDEAL Boilers and AMERICAN Radiators for every heating need

104 West 42nd Street, Dept.—T-87
NEW YORK

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816 So. Michigan Ave., Dept.—T-87
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THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

HEAT EMITTED BY DIRECT RADIATION.

RESEARCH LABORATORY STANDARD DATA
AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS
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TABLE 4. HEAT EMITTED BY DIRECT RADIATION—FOUR-COLUMN RADIATORS

Steam Temperature at 215 deg. fahr *Room Temperature at 70 deg. fahr.*

No. of Sections	45 In		38 In		32 In		26 In		23 In		20 In.	
	Rated Surface sq. ft	Total B.t.u. per hr	Rated Surface sq. ft.	Total B.t.u. per hr	Rated Surface sq. ft.	Total B.t.u per hr	Rated Surface sq. ft.	Total B.t.u. per hr.	Rated Surface sq. ft.	Total B.t.u per hr	Rated Surface sq. ft.	Total B.t.u. per hr.
1	10	3092	8	2567	6.5	2166	5	1730	4	1430	3	1125
2	20	5000	16	4150	13.0	3513	10	2808	8	2320	6	1823
3	30	6909	24	5730	19.5	4859	15	3887	12	3211	9	2522
4	40	8816	32	7315	26.0	6205	20	4964	16	4101	12	3218
5	50	10725	40	8900	32.5	7550	25	6043	20	4992	15	3917
6	60	12636	48	10483	39.0	8896	30	7122	24	5882	18	4615
7	70	14539	56	12069	45.5	10242	35	8198	28	6773	21	5313
8	80	16445	64	13651	52.0	11588	40	9276	32	7664	24	6011
9	90	18360	72	15235	58.5	12934	45	10355	36	8554	27	6710
10	100	20270	80	16816	65.0	14281	50	11435	40	9444	30	7404
11	110	22176	88	18396	71.5	15627	55	12513	44	10336	33	8103
12	120	24084	96	19978	78.0	16973	60	13592	48	11227	36	8802
13	130	25987	104	21570	84.5	18320	65	14671	52	12118	39	9501
14	140	27902	112	23150	91.0	19665	70	15750	56	13009	42	10198
15	150	29805	120	24732	97.5	21011	75	16827	60	13896	45	10895
16	160	31712	128	26330	104.0	22357	80	17904	64	14784	48	11592
17	170	33626	136	27921	110.5	23702	85	18981	68	15675	51	12291
18	180	35537	144	29506	117.0	25049	90	19061	72	16567	54	12987
19	190	37430	152	31084	123.5	26395	95	21140	76	17459	57	13685
20	200	39340	160	32652	130.0	27742	100	22220	80	18352	60	14382

RADIATION COMPUTING—Heat Emitted by Radiators, Direct Four-Col. | No. 13-PP

Copies of this Data Sheet, printed separately, 5 cents each.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

HEAT EMITTED BY DIRECT RADIATION.

RESEARCH LABORATORY STANDARD DATA
AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS
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TABLE 5. HEAT EMITTED BY DIRECT RADIATION—HOSPITAL RADIATORS—TWO COLUMNS

Steam Temperature at 215 deg. fahr. *Room Temperature at 70 deg. fahr.*

No. of Sections	45 In.		38 In.		32 In.		26 In.		23 In.		20 In.	
	Rated Surface sq. ft.	Total B.t.u. per hr	Rated Surface sq. ft.	Total B.t.u. per hr	Rated Surface sq. ft.	Total B.t.u. per hr	Rated Surface sq. ft.	Total B.t.u. per hr.	Rated Surface sq. ft.	Total B.t.u. per hr.	Rated Surface sq. ft.	Total B.t.u. per hr.
1	5	1966	4	1628	3.33	1391	2.66	1128	2.33	998	2	861
2	10	3118	8	2597	6.66	2219	5.33	1813	4.66	1606	4	1391
3	15	4271	12	3558	10.00	3051	8.00	2498	7.00	2213	6	1921
4	20	5424	16	4520	13.33	3878	10.66	3179	9.33	2821	8	2448
5	25	6575	20	5480	16.66	4710	13.33	3864	11.66	3429	10	2979
6	30	7725	24	6439	20.00	5538	16.00	4547	14.00	4036	12	3509
7	35	8875	28	7400	23.33	6369	18.66	5228	16.33	4644	14	4038
8	40	10028	32	8362	26.66	7196	21.33	5913	18.66	5251	16	4568
9	45	11183	36	9324	30.00	8025	24.00	6600	21.00	5859	18	5099
10	50	12335	40	10284	33.33	8856	26.66	7282	23.33	6468	20	5626
11	55	13487	44	11242	36.66	9684	29.33	7966	25.66	7074	22	6156
12	60	14640	48	12206	40.00	10512	32.00	8650	28.00	7683	24	6686
13	65	15789	52	13166	43.33	11341	34.66	9330	30.33	8290	26	7215
14	70	16940	56	14129	46.66	12169	37.33	10016	32.66	8899	28	7744
15	75	18090	60	15084	50.00	13000	40.00	10696	35.00	9506	30	8274
16	80	19248	64	16045	53.33	13829	42.66	11378	37.33	10114	32	8803
17	85	20400	68	17007	56.66	14658	45.33	12062	39.66	10722	34	9333
18	90	21551	72	17971	60.00	15486	48.00	12744	42.00	11327	36	9864
19	95	22705	76	18932	63.33	16314	50.66	13425	44.33	11935	38	10393
20	100	23850	80	19888	66.66	17142	53.33	14111	46.66	12544	40	10920

RADIATION COMPUTING—Heat Emitted by Hospital Radiators Two Col. No. 13-QQ

Copies of this Data Sheet, printed separately, 5 cents each.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

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AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS
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TABLE 6. HEAT EMITTED BY DIRECT RADIATION—WALL RADIATORS

Steam Temperature at 215 deg. fahr. *Room Temperature at 70 deg. fahr.*

No. of Sections	9B—29 in		7B—22 in		5A—12 in	
	Rated Surface sq. ft	Total B.t.u. per hr.	Rated Surface sq. ft	Total B.t.u per hr	Rated Surface sq. ft	Total B.t.u per hr
1	9	2853	7	2234	5	1658
2	18	5456	14	4281	10	3208
3	27	8059	21	6327	15	4758
4	36	10663	28	8372	20	6308
5	45	13266	35	10426	25	7860
6	54	15869	42	12466	30	9408
7	63	18472	49	14513	35	10959
8	72	21074	56	16559	40	12508
9	81	23676	63	18604	45	14063
10	90	26280	70	20650	50	15610
11	99	28888	77	22700	55	17160
12	108	31493	84	24746	60	18708
13	117	34094	91	26790	65	20261
14	126	36696	98	28832	70	21812
15	135	39299	105	30881	75	23363
16	144	41904	112	32928	80	24913
17	153	44508	119	34974	85	26461
18	162	47110	126	37019	90	28008
19	171	49715	133	39062	95	29560
20	180	52322	140	41118	100	31110

RADIATION COMPUTING—Heat Emitted by Wall Radiators No. 13-RR

Copies of this Data Sheet, printed separately, 5 cents each.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

HEAT EMITTED BY DIRECT RADIATION.

RESEARCH LABORATORY STANDARD DATA
AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS
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TABLE 7 HEAT EMITTED BY DIRECT RADIATION—WINDOW RADIATORS

Steam Temperature at 215 deg. fahr. *Room Temperature at 70 deg fahr.*

No. of Sections	20 In. Rated Surface sq ft	20 In. Total B.t.u. per hr.	16 In. Rated Surface sq ft	16 In. Total B.t.u per hr	13 in. Rated Surface sq ft	13 in. Total B.t.u per hr
1	5	1708	3.75	1332	3	1082
2	10	2761	7.50	2156	6	1762
3	15	3816	11.25	2979	9	2441
4	20	4872	15.00	3803	12	3119
5	25	5930	18.75	4626	15	3798
6	30	6987	22.50	5450	18	4477
7	35	8043	26.25	6274	21	5156
8	40	9098	30.00	7098	24	5836
9	45	10152	33.75	7921	27	6516
10	50	11210	37.50	8745	30	7194
11	55	12265	41.25	9570	33	7871
12	60	13320	45.00	10395	36	8550
13	65	14378	48.75	11217	39	9227
14	70	15435	52.50	12038	42	9908
15	75	16490	56.25	12864	45	10589
16	80	17544	60.00	13686	48	11266
17	85	18598	63.75	14510	51	11944
18	90	19656	67.50	15336	54	12625
19	95	20710	71.25	16160	57	13304
20	100	21770	75.00	16988	60	13986

RADIATION COMPUTING—Heat Emitted by Window Radiators No. 13-SS

Copies of this Data Sheet, printed separately, 5 cents each

TYPICAL JENNINGS INSTALLATIONS

A SERIES

NEW YORK

14 PUBLIC SCHOOLS

COMMODORE HOTEL

CUNARD BUILDING

GARMENT CENTER REALTY CO.

SAKS DEPARTMENT STORE

MACEY DEPARTMENT STORE

PIERRE'S

SHERRY'S

ST. BARTHOLOMEW'S CHURCH

BORDEN BUILDING

MUNSON BUILDING

MUNCEY BUILDING

NEW TRIBUNE BUILDING

NATIONAL CITY BANK

NEW ROOSEVELT APT. BLDG.

KNICKERBOCKER HOTEL

BANKERS TRUST CO. BLDG.

ENGINEERING SOCIETIES BLDG.

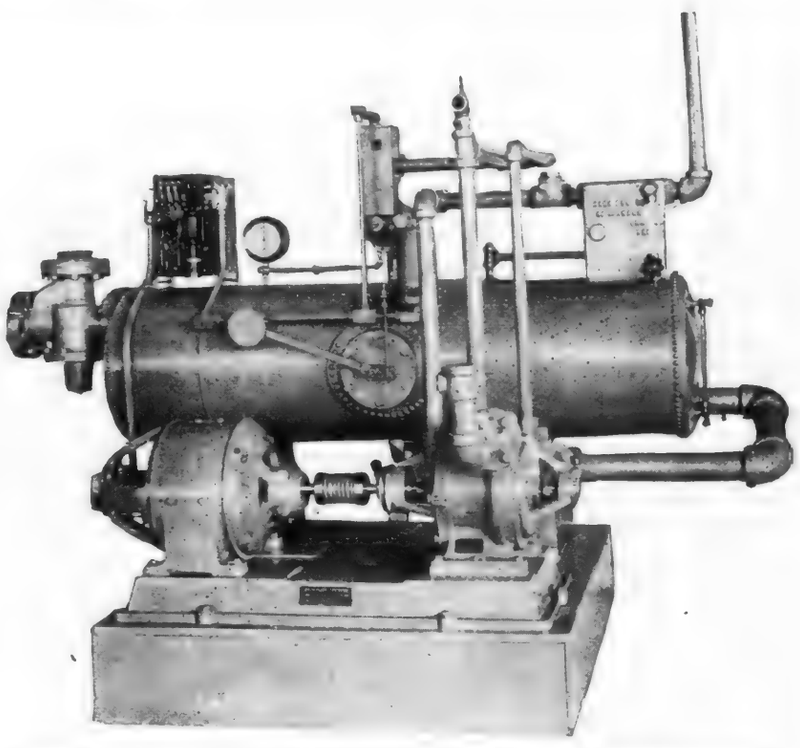
N. Y. U. LAW SCHOOL

BOWERY SAVINGS BANK

THE JENNINGS HYTOR

RETURN LINE VACUUM HEATING PUMP

Heart of the Heating System



Size E Jennings Hytor Return Line Vacuum Heating Pump arranged for automatic operation, handling 65,000 square feet radiation, requiring only 3.9 brake horse power when delivering from a vacuum of 10 inches of mercury against a boiler pressure of 10 pounds.

NO MATTER how well designed a Return Line Heating system may be, its satisfactory operation is largely dependent upon the proper functioning of the Vacuum Return Line Pump. The Jennings pump has proven on thousands of installations that it possesses the features necessary for proper operation under the most extreme conditions.

Jennings Return Line Pumps are simple in construction, containing but one moving element, running with a clearance in the casing. They are simple to install and operate, they require little floor space and are noiseless in operation. Their use results in a marked economy in coal. Many users hold that they more than pay for themselves in this respect alone. A Jennings pump on your system means quick heat in the most isolated radiators at a minimum steam pressure.

Now is the time to consider equipment for replacements and new installations for next season. Our Engineering Department is at all times ready to render service on problems relating to heating.

NASH ENGINEERING CO.

SO. NORWALK, CONN., U. S. A.

Trade and Miscellaneous Notes

Coming Events.

June 20-23, 1923.—Fourteenth annual meeting of the National District Heating Association at Cedar Point, O.

June 25-30, 1923.—National Exposition of Building Ideas at new Public Auditorium, Cleveland, O.

June 26-28, 1923.—Forty-first annual convention of the National Association of Master Plumbers in Atlantic City, N. J. Headquarters at the Hotel Breakers.

September 10-13, 1923.—Eighteenth annual meeting of the American Society of Sanitary Engineers, in Davenport, Ia. Headquarters at the Hotel Blackhawk.

October 20-28, 1923.—Safety Health and Sanitation Exhibition at 106th Infantry Armory, Brooklyn, N. Y.

December 12-16, 1923.—Annual convention of the National Association of Practical Refrigerating Engineers, in Memphis, Tenn.

Miscellaneous Notes

Arbitration Educational Week was observed in New York May 14 to 20, when more than a score of the city's civic and trade organizations combined to spread a general knowledge of the State's amended arbitration law, and to urge substitution of arbitration for litigation. Although New York's law is two years old, it was pointed out that not more than 4 per cent. of the business men of the city have a clear knowledge of its provisions. Outstanding facts brought out by the observance were that decisions arrived at through arbitration are irrevocable and that any sort of controversy or dispute, except criminal and divorce cases, where questions of fact only and not of law are concerned can be adjudicated by arbitration.

Building Operations, as reflected in contracts awarded, showed signs of slackening in April, according to figures compiled by F. W. Dodge Corporation. The rate of increase in 36 eastern States was only 7 per cent, whereas normally April shows an increase of from 15 per cent. to 20 per cent. over March. The value of contracts awarded in the 36 States during April was $399,243,000. Slowing down of the seasonal rate of increase was considered a wholesome sign. Construction started between January 1 and May 1 showed an increase of 15 per cent over the corresponding period a year ago.

Spokane, Wash.—A novel heating survey conducted by the James Smyth Plumbing & Heating Co., and covering 7,251 homes out of the city's approximately 22,000 homes disclosed that only 366 of the homes visited were heated by hot water or steam. About 6,000 were being heated by stoves, 900 by pipeless furnaces, and 600 by pipe furnaces. Sixty high school girls made the survey and the information gained will be used in connection wth a "free coal" and "old stove" campaign to be run by the Smyth Company in June and July in an effort to sell heating plants.

National Trade Extension Bureau has announced extension of many of its services to the Canadian plumbing and heating trade through an arrangement with *Sanitary Engineer*, a Canadian trade paper. The bureau's services include material on practically all phases of heating and plumbing work, such as management problems, technical problems, office routine, publicity and development of trade.

Washington, D. C.—Speaking in Washington recently General R. C. Marshall, Jr., chief of the Construction

Three famous fans

There are three famous fans that figure in this country of ours—the movie fan, the baseball fan and the Autovent Fan. To you, the one of most importance is the Autovent Fan. It is the fan necessary to your work, it is the fan that enters upon your daily professional and business activity.

And for years those in the ventilating field have known the Autovent Motor Driven Propeller Fan for its efficiency and adaptability to seemingly impossible conditions. They have also known it for neatness in appearance and ease of installation. And knowing its good points they have specified it, as thousands of installations show.

The Autovent Fan has solved many ventilating problems. It can solve yours.

AUTOVENT FAN & BLOWER COMPANY

730-38 West Monroe St., Chicago, Illinois

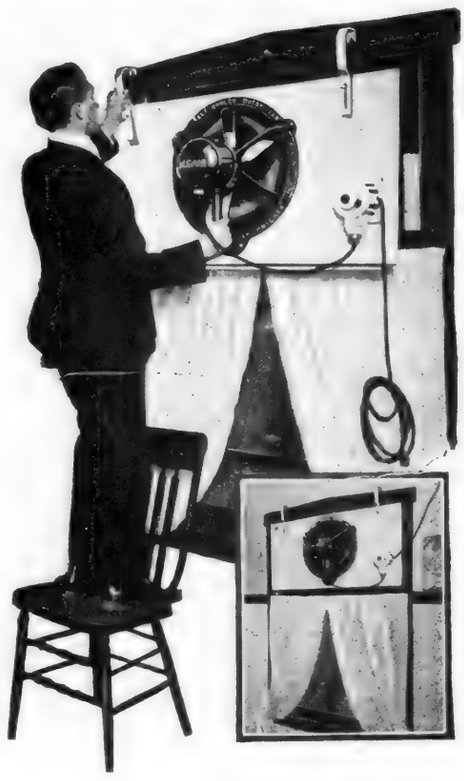
REGISTERED AUTOVENT

Division of the army during the war, characterized the action of the attorney-general in requesting postponement of several cases involving contractors who built army cantonments as either a "frank confession of a gross mistake" or "ignominious defeat." General Marshall defended the contractors involved in the suits, citing the fact that many important organizations had declared their faith in these men, and declared the defendants were entitled to a speedy trial so that their names might be cleared.

Health Work undertaken by the Metropolitan Life Insurance Company, added an average of 8½ years to the life of industrial policy holders in 1922, with a saving of $11,828, 743 in death claims during the year. The company, through its agents, distributed 30,872,-170 pieces of literature on health subjects to policy holders, and reached also more than 1,000,000 school children, 759,000 social agencies and 191,223 health officers. It co-operated in 440 clean-up campaigns, 161 health compaigns, held 265 health exhibits and 17 picnics and combated 134 epidemics. Nurses employed by the company made 2,196,444 visits in handling 418,196 cases.

Los Angeles, Calif.—A Publicity Bureau of Heating and Ventilating, probably the only one of the kind in the United States, has been opened in the new building of the Merchant Plumbers' Association. The rooms are equipped with a complete library consisting of manufacturers' literature on steam and water heating systems, ventilating apparatus and temperature control equipment. The bureau is charged with the promotion of sanitary and healthful heating of all types of buildings and is maintained by manufacturers and contractors in these lines. Its services are available to engineers and architects.

New York—Heating and ventilating exhibits at the "Own-Your-Own-Home" Exposition in the 69th Regiment Armory recently attracted wide attention and much favorable comment. The Kelsey Heating Co., Syracuse, N, Y. displayed its warm-air furnace and also the Kelsey automatic humidifier. Another exhibit of interest was that of



THE NEW PORTABLE ILGAIR VENTILATOR

HERE'S another Ilg development—the **Ilgair Portable Panel**—just the thing for homes, offices, stores, hotels, etc., where a permanent installation is not desirable.

It's the greatest idea for 1923. Fits any window—can be installed in a jiffy. No screws or nails required—simply hang it like a picture on the wall, then make connection with a nearby lamp socket, and the job is done.

MADE IN THREE SIZES TO TAKE CARE OF WINDOWS RANGING FROM 25" TO 48" WIDER IF NECESSARY AT ONE COST—NO EXTRAS

SEND FOR LITERATURE

HIGH EFFICIENCY ILG VENTILATING MACHINERY

Ventilation

FOR OFFICES · STORES · FACTORIES · PUBLIC BUILDINGS · RESTAURANTS · THEATRES · HOUSES · ETC ·

ILG ELECTRIC VENTILATING CO. 2838 NORTH CRAWFORD AVE. CHICAGO

BRANCHES IN ALL PRINCIPAL CITIES

14 Carrier Air Washers and 27 Buffalo Fans are used in the Virginia, Minn., Vocational School.
American Heating Co., Contractor.

Everywhere youthful lives are conserved by Buffalo Heating & Ventilating Systems—Adults deserve and need just as much

You know how you could eat most anything, disregard draughts, and do many things when you were young you would not dare to do today.

The highest health authorities of this country have many times decreed the use of Buffalo Fans and Carrier Air Washers in schools and other public buildings.

If this combination, which takes many pailfuls of filth out of the air each week, is good for a vocational school it is surely good for the industries represented by departments in the school.

And there are indisputable statistics which show less time lost by sickness following installation of Buffalo Fans and Carrier Air Washers.

Let Dept. No. 36 tell you the whole story without obligation.

BUFFALO FORGE COMPANY

480 Broadway
BUFFALO, N. Y.

the Richardson & Boynton Co., New York, consisting of furnaces and steam and water heaters. Many viewed with interest the Minneapolis heat regulator which demonstrated the use of a clock and thermostat in setting the draft to open or close at a given time.

Willis H. Carrier, president of the Carrier Engineering Corporation, is in Europe on a business trip. He expects to remain abroad a month and will make his headquarters at the Company's London office.

National Exposition of Chemical Industries, to be held September 17 to 22 at the Grand Central Palace, New York, is working on a plan which it is hoped will result in attendance by a larger proportion of the buying power in the industry than at past expositions. A questionnaire has been sent by the management of the exposition to all prospective exhibitors to determine the industries each is most desirous of reaching through the exhibits. The management also has published for distribution a pamphlet entitled "Getting the Most Out of Your Exhibit."

Eastern Supply Association will hold its summer meeting at Hotel Astor, New York, Wednesday, June 13. Notice to this effect has been sent out by Frank S. Hanley, the secretary.

Long Beach, Calif.—Several thousand gas consumers of the Southern Counties Gas Company have received copies of an article by Dr. Arthur R. Maas, of the University of Southern California, entitled "Some Facts About Gas." Dr. Maas states that "ventilation in burning gas appliances is the most scientific and safe way in handling the gas heating problem." He points out that no one would think of starting a coal or wood fire in a stove without a stove pipe and urges that gas heaters have proper ventilation.

National Association of Sales Managers, organized recently at a conference of committees representing the sales managers' clubs of New York, Philadelphia, Boston, St. Louis, St. Paul, Columbus and Milwaukee, called its first annual convention for June 7 in Atlantic City, immediately following the convention of the Associated Advertising Clubs of the World. Sales Managers throughout the country were invited to become members and to attend the first convention. Charles F. Abbott, of Montclair, N. J., was selected as chairman of the temporary organization.

Cleveland, O.—The new nine-story home of the Penton Publishing Company, constructed at a cost of about $1,000,000, has been completed and the various members of this trade journal family have moved in. The building contains 167,000 sq. ft. of floor space and the walls and floors are of heavier construction than usual to support heavy machinery and paper and to withstand vibration. It was U-shaped so that daylight reaches every room. Heating and ventilating and other conveniences are of the most modern construction.

Aberdeen, Wash.—The house committee of the Elks lodge has been authorized to install a heating plant for the lodge hall. Plans call for the installation of a plant adequate to care for any future construction on the present lodge hall site. The plant is to use oil for fuel.

Central Station Heating Notes.

Eugene, Ore.—A site 66 ft. by 160 ft. has been selected for the erection of the new heating plant of the University of Oregon, soon to be constructed.

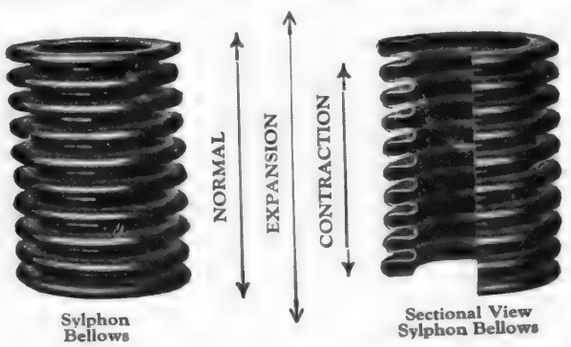
Walla Walla, Wash.—Work on the new Whitman college heating plant is now under way and Contractor George H. Sutherland expects to have it completed in June. All the college buildings, including Langdon house, Green cottage, the President's home, and the library will be heated from the central plant. The plant will cost $24,730.

Wichita, Kan.—Three different kinds of heating systems get their heat from the boilers in the basement of the Fourth National bank here. The Fourth National uses a vacuum system; the Michigan building uses a Moline; and the Winne building a one-pipe gravity. Another interesting feature of the heating plant in the Fourth Na-

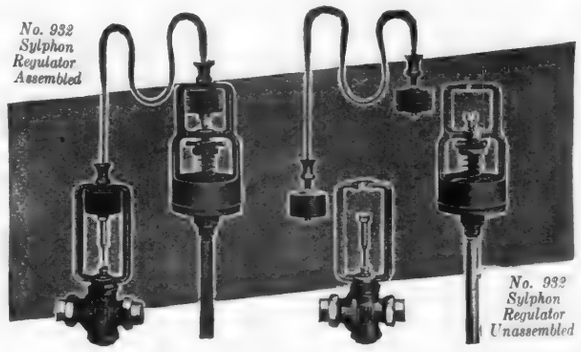
Sylphon TRADE MARK

New Three Part Temperature Regulator for Hot Water Tanks—Easily installed—no matter how awkwardly steam line is located.

Its valve can be separately installed, even in tight corners and elevated locations. The bulb separately fixed in tank—both can then be easily joined by slipping power transmission unit into quick detachable T-slot connections. These features are patented and possessed by no other regulator on the market.



Sylphon Bellows — Sectional View Sylphon Bellows


No. 932 Sylphon Regulator Assembled — No. 932 Sylphon Regulator Unassembled

EASY TO REPAIR

Any of the three parts can be removed without disturbing the others. Spare parts carried in stock for immediate use insure against shut down in case any part is accidentally damaged. These regulators contain the Sylphon bellows—that seamless, solderless, flexible, all-metal, expansion member, which is the heart of all Sylphon products. Its everlasting flexibility, having stood under test, millions of expansions and contractions without any discernible effect upon its physical properties, is the reason for the accurate, positive and dependable temperature control of Sylphon instruments. Do not accept imitations or substitutes. We are the originators, patentees and manufacturers.

Send for bulletin WTR-103

THE FULTON COMPANY

Knoxville, Tennessee
New York Chicago Detroit Philadelphia
Representatives in all Principal Cities

How to Make Kitchens Comfortable

Before designing another home just make a mental note of this one important point—the kitchen *can* be made one of the most pleasant and comfortable rooms in the house, by simply providing the method of removing the vapors and smoke from cooking foods and bringing in fresh, cool outdoor atmosphere.

The American Blower Ventilating Fan makes kitchens delightful and pleasant. Running in one direction the fan takes out the fumes, odors and smoke. Then by simply pulling the cord the fan runs in the opposite direction and brings in the cool, clean air.

With its adjustable fan frame, it may be installed quickly and easily and will not require any change in your specifications.

The fan for house kitchens is but one of the various types of ventilating apparatus built by the American Blower Company. We make equipment for ventilating offices, theatres, stores, factories, school buildings, laundries—business places of all kinds and sizes.

AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO (282)

American Blower

"Sirocco" TRADE MARK

EXHAUSTERS · VENTILATING FANS · AIR WASHERS · BLOWERS · ENGINES

FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT

tional Bank is an air conditioning system, which cools the air in summer and heats it in winter.

Alva, Okla.—A legislative appropriation has given Northwestern State Teachers' College here the sum of $10,000 for repairs to the college central heating plant.

Louisville, Ky.—A central heating plant will be constructed in connection with expenditures of $2,000,000 for buildings for the new Southern Baptist Theological Seminary here.

Manufacturers' Notes.

Ohio Brass Co., Mansfield, O., has announced plans for construction of two buildings to give the plant of the Ohio Insulator Co., a subsidiary at Barberton, O. 16,000 sq. ft. additional floor space. Several other buildings will be added later.

Trane Co., La Crosse, Wis., has appointed Harry J. Ryan as representative in charge of the company's Albany, N. Y. office to succeed the late W. S. Ransom.

Sterling Engineering Co., Milwaukee, Wis., has increased the space devoted to manufacturing by moving its offices to Suite 202, Metropolitan Block, at Third and State Streets. The additional space for manufacturing was made necessary, President C. J. Rice announced, by the addition of departments to produce the Sterlco condensation pump and receiver and the combination vacuum-condensation pump and receiver.

American Radiator Co., Chicago, has removed its Buffalo N. Y. office from 693 Main St., to the new Jackson Building.

Williamson Heater Co., Cincinnati, O., is building a 100 ft. by 400 ft. addition to its plant at 450 Marbury avenue.

Richmond Radiator Co., New York, is spending $50,000 on new buildings and improvements at its plant near Uniontown, Pa.

United States Radiator Corporation, Detroit, Mich., has leased 2,500 sq. ft. of office space on the seventh floor of the Boyce building at Dearborn and Illinois streets in Chicago. The Chicago offices at present are located in the Railway Exchange building.

Abram Cox Stove Co., Philadelphia, Pa., announces that A. A. Kiewitz is now with the company, with headquarters in New York.

Barnes & Jones, Boston, Mass., manufacturers of the Barnes & Jones modulation vapor and vacuum systems of heating, has appointed the Standard Steam Specialty Co., 366 Third Ave., New York, as its sales representatives for the metropolitan district. The Standard Steam Specialty Company manufactures the well-known line of Utility steam specialties and the addition of the Barnes & Jones line will enable the company to give the trade a very complete service in this field.

Autovent Fan & Blower Co., Chicago, Ill., has appointed the A. I. Clifford Company, 507 Odd Fellows Building, Indianapolis, Ind., as district representative for the company's line of Autovent fans and louvres and Uniblade pressure and volume blowers. Mr. Clifford is an experienced engineer which will enable him to be of practical service in connection with the selection of ventilating equipment. The company has also appointed George W. Hoffman, 1535 Cherry St., Philadelphia, Pa., as district representative in the Philadelphia territory. Mr. Hoffman has also had experience as a ventilating engineer.

Business Changes.

W. Harwell Allen has left the Memphis Heating Co., to accept the presidency of the State Heating & Power Co., with offices in Memphis and Nashville, Tenn.

C. Gordon Huntley, AM. I. E. E., MI. H. V. E, and William W. Wood, A. R. I. B. A. have formed a partnership for practice as consulting engineers under the name of Huntley & Wood at P. & O. House, Cockspur Street, S. W. I. London, England. They are specializing in heating, ventilating and illuminating and desire to receive trade catalogues.

Universal Pipe & Radiator Co., is the name of a new company to be formed through the consolidation of the prop-

PUBLIC SCHOOL No. 62, BRONX, New York City, N. Y.
Over one Hundred Lehigh Fans are installed in New York City Schools

LEHIGH MULTIBLADE FANS

FOR HEATING AND VENTILATING

WHERE large volumes of air are to be handled at comparatively low pressures such as in heating and ventilating systems LEHIGH Multiblade Fans are guaranteed to be equal to, if not superior, to any other fans on the market.

HERSH BROTHERS CO.

654 Mill Street **ALLENTOWN, PA.**

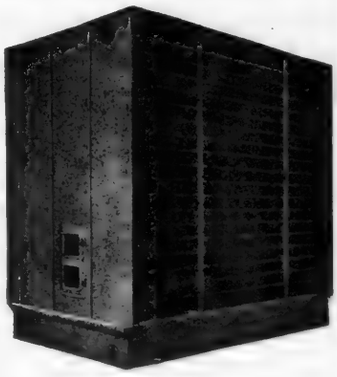
Peerless Ventilator

BUILT RIGHT RUN RIGHT

The New York Blower Co.

Chicago, Ill. **La Porte, Ind.**

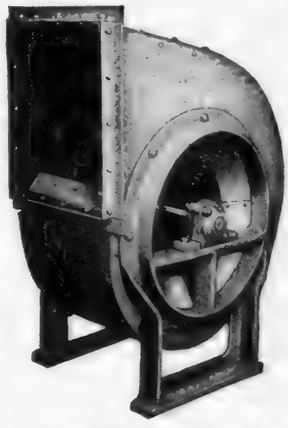
We manufacture a complete line of fan equipment and appurtenances. By concentrating on this one class of products we are able to make them better every year.



Peerless Air Washer

Pulley Driven Disc Fan for Mines

The old fallacy that fan equipment was a luxury is now known to be untrue; it is an economical necessity. We can give actual installations in all kinds of industries where through the wise employment of fan equipment manufacturers have improved the quality of their product, and increased production with a reduction in factory cost.



Type "C" Seri-Vane Fan

If you are interested in drying, humidifying, heating, ventilating, mechanical draft, removal of shavings or similar installations, please communicate with us. If we cannot honestly prove facts to you showing the benefits that will follow from an installation for your special problem, we will frankly so state.

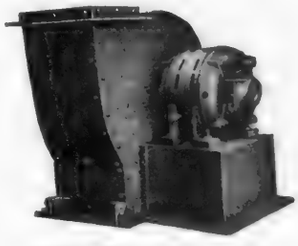
Motor Driven Propeller Fan

Slow Speed Planing Mill Exhauster

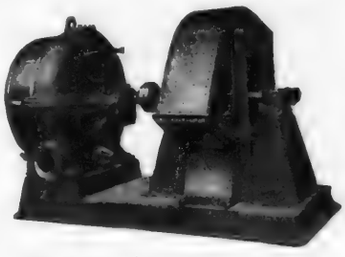
The New York Blower Co.

Chicago, Ill. **La Porte, Ind.**

Branch Offices in Principal Cities



High Speed Type "C" Seri-Vane Fan



High Pressure Blower Direct Connected to Turbine

Stoker Fan

erties of the Iron Products Corporation, the Central Foundry Co., and the Central Radiator Co. Letters outlining the plan of recapitalization have been sent to the stockholders. The new company will have a capitalization of 90,000 shares 7% cumulative stock of $100 par value and 180,000 shares of common stock of no par value. It will control also the subsidiaries of the Iron Products Corporation.

Michigan City, Ind.—Joseph W. Hays is completing the organization of a corps of consulting combustion engineers to be known as Jos. W. Hays and Associates, with headquarters in Michigan City, Ind. The organization will be prepared to render consulting service in steam plants in all parts of the country. Each member of the organization will be a combustion expert of practical experience and none of the associates is to change his place of residence. Each will look after the engineering work in his immediate territory.

New Incorporations.

Beggs Engineering Co., Inc., 142 Russ St., Hartford, Conn., capital $500,000. Officers: T. R. Beggs, president; B. J. Smith, vice president; J. H. Kane, secretary and treasurer. The company will manufacture valves, fittings and machinery.

Bernhard Boiler Co., Elyria and Cleveland, O., capital $300,000. Officers: J. B. Bernhard, president and general manager; M. L. Johnson, secretary-treasurer; B F. Thomas, chairman of the board of directors. The company has purchased the plant of the Lima Steel Casting Co., at Lima, O., where production will be started as soon as new machinery is installed.

Jennison Company, Fitchburg, Mass., capital $100,000. Incorporators: Herbert E. Jennison and William H. Dolan of Fitchburg, and James H. P. Dyer of Leominster. The company will manufacture heating and plumbing specialties.

A. F. Robinson Boiler Works, Cambridge, Mass., capital $100,000. Incorporators: John A. Jefferson, Somerville, Mass.; Josephine M. Robinson, Arlington, Mass.; and Fred B. Wheeler, Boston.

Roe Door & Window Co., 110 S. Dearborn St., Chicago, Ill., capital $75,000. Incorporators: E. A. Bruegel, Bradley Roe, and John G. McDonald. The company will deal in ventilating apparatus and metal specialties.

Henderson & Hawkins, Inc., 1013 Broadway, Chicago, capital $10,000. Incorporators: J. F. Henderson, E. W. Hawkins, and George H. Seggelke. Correspondent Warren H. Orr, Carthage. The company will deal in general plumbing, heating and metal works.

Hod Plumbing & Heating Co., 1507 Decatur avenue, Moline, Ill., capital $10,000. Incorporators: Ray Hanson, William Lage, and A. L. Hogdon. Correspondent, George W. Wood, Moline. The company will conduct a heating, plumbing and construction business.

Business Troubles.

Toledo, Ohio.—The Joseph F. Grosswiller Supply Co., has filed a voluntary petition in bankruptcy, scheduling assets of $102,879.69 and liabilities of $179,661.59.

Contracts Awarded.

Pasadena, Calif.—Bids were received as follows for heating the new Washington school building: Lohman Brothers, $14,417; Munger & Munger, $14,760; Franklin & Boyce, $14,538; E. O. Nay Co., $15,690; Arthur Hess, $17,757; and Thomas Haverty, $17,924.

Co-operative Plumbing Co., Ponca, Kan., heating, and the Western Sheet Metal Co., Wichita, plumbing at the new Jefferson school building in Ponca, including oil burners, for $17,234.

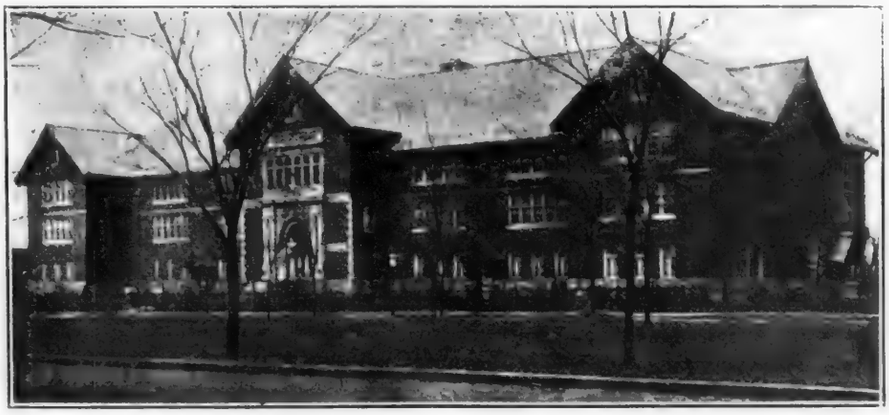
MacMahon Company of Kansas City, Mo., heating and plumbing—the addition to the Benton school, Kansas City, for $15,712.

Kansas City, Kan.—Bids were received as follows for heating and plumbing the new Kansas City, Kan., high school gymnasium: Interstate Co., $21,560; Charles Hunter, $24,666; and Duncan & Lynch, $22,336.

Buck & Boyd, Vincennes, Ind., heating and plumbing the new township school at Wheatland, for $12,992.

Moline, Ia.—Lockhart Heating & Plumbing Company, heating and plumbing new office building of the Montgomery Elevator Co., in Moline.

Jones-Kinn Co., Tiffin, O., heating



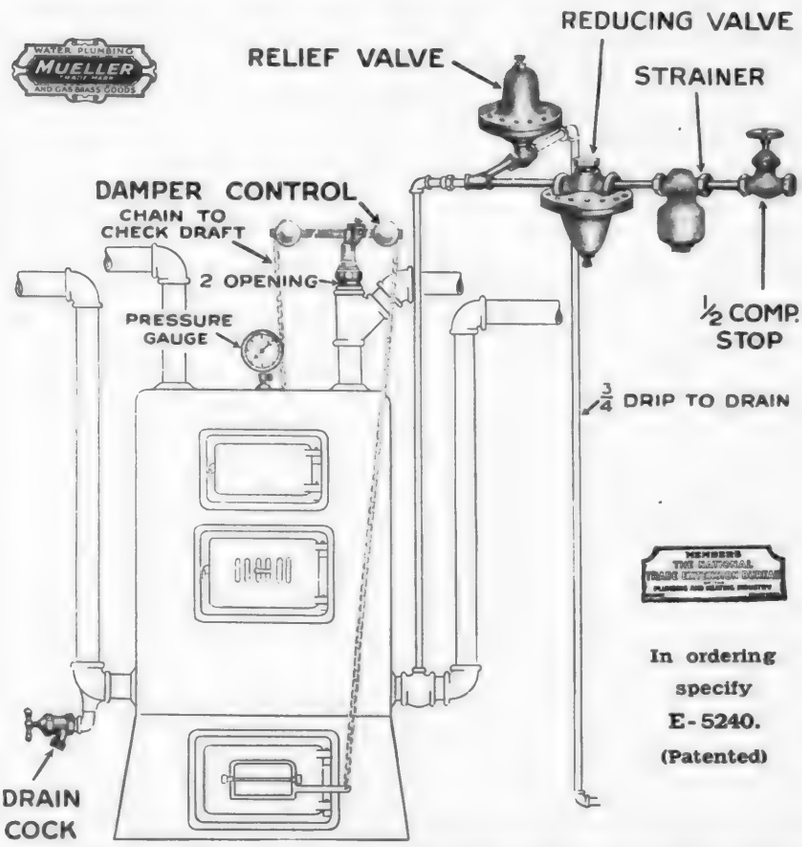
Woodward School

ELECTROZONE VENTILATED

Operating cost less than half of that of like size buildings. *Write for details.*

THE AIR CONDITIONING & ENGINEERING CO.

2914 So. Jefferson Ave. St. Louis, Mo.



Quick Sales and Satisfied Customers

come to plumbers and heating contractors handling the ***MUELLER*** Automatic System of Hot Water Heat Control. There is a popular demand for it, and it will pay to specialize on this system which gives lasting satisfaction.

Mueller Automatic System of Hot Water Heat Control

removes to the greatest degree the care and responsibility of attention to the heating system—that's what the householder wants—that's why they like the ***MUELLER*** System—no expansion tank—no worry—no trouble.

Heating troubles are still fresh in mind. Good time to get after business at a good profit. Write your jobber or us.

H. MUELLER MANUFACTURING CO., Decatur, Ill., U. S. A.

PHONE BELL 153

Water, Plumbing and Gas Brass Goods and Tools.

New York City, 145 W. 30th Street
Phone Penn. 2468

Sarnia, Ontario, Canada

San Francisco, 635 Mission Street
Phone Sutter 3577

Mueller Metals Co., Port Huron, Mich., Makers of "Red Tip" Brass Rod; Welding Rod; Brass and Copper Tubing; Forgings and Castings in Brass and Bronze; also Brass Screw Machined Products.

and ventilating new Tiffin Junior High school for $18,270.

Dan Hamilton, Galveston, Tex., heating and plumbing new Administration building of the Galveston Y. W. C. A., for $16,000.

Rushlight-Hasdorf-Lord Co., Portland, Ore., heating and plumbing Pythian home at Vancouver, Wash., for $48,254.

Clinton, Ia.—Bids were received as follows for heating and plumbing in the new Turner building in Clinton: C. E. Armstrong & Sons, $13,220; John Jaeger & Sons, $13,822; E. N. Woodbury, $15,280; and J. E. O'Neil, $15,718.

Orr & Company, Sioux City, Ia., heating and plumbing additions to three Sioux City elementary school buildings, for $15,679.

Alaska Plumbing & Heating Co., Portland, Ore., heating and ventilating new Chapman school at Portland for $20,655. The plumbing contract went to Rushlight & Hasdorf for $41,656.

Bucyrus, O.—Bids were received as follows for heating the Bucyrus Holmes-Liberty consolidated school building: (furnace system), Columbus Heating & Ventilating Co., $12,490; Bruce Heating & Ventilating Co., $12,723; (Steam heat) $17,025 and $17,285 respectively.

Marion, Ind.—Swanger & McCann have been awarded the heating and plumbing contract for Marion's new $450,000 six-story hotel.

Business Chances.

Detroit, Mich.—Thirteen building projects for Detroit's school system have been approved by the City Council, including $1,500,000 for elementary buildings, $275,000 for Western high school, and $21,000 for Davison open-air school. The board of education has asked also for $150,000 for the Roosevelt Field heating plant.

Sioux City, Ia.—City Building Inspector F. E. Colby estimates the heating and plumbing of Sioux City's new $500,000 fire and police headquaters, soon to be erected, will cost about $25,000.

Washington, D. C.—Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, for the following named work:

Until May 28, 1923, for the construction of the United States Post Office at Saco, Maine.

Until June 15, 1923, for furnishing and installing certain new underground steam piping, etc., at the U. S. Veterans' Hospital, Perryville, Md.

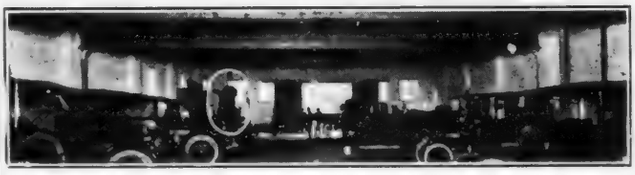
Brooklyn's Safety, Health and Sanitation Exhibition

More than 100,000 special invitations to attend the Safety, Health and Sanitation exhibition to be held at the 106th Infantry Armory in Brooklyn, October 20 to 28, 1923, will be sent out through civic and technical organizations which are cooperating in the show.

One of the most interesting departments of the exhibition is to be devoted to equipment for the proper heating, ventilating and lighting of homes. The Safety Section, which will be under the direct approval and cooperation of the American Society of Safety Engineers, will conduct a daily program of safety talks.

Among the organizations which will issue special invitations are: American Society of Heating and Ventilating Engineers, Brooklyn and Queens Chamber of Commerce, Medical Society and the Department of Health.

HEATING RATES, 1922-1923, including those in effect in no less than 142 cities are listed in a bulletin issued by the Ric-Wil Co., Cleveland, O., calling attention incidentally to the Ric-Wil underground conduit system for steam or hot water pipes. One of the illustrations shows a typical installation in course of construction. A circular accompanying the bulletin shows the company's four types of conduit designed to meet all conditions. The sizes range from 4 to 24 in. for any number of pipes. Details are given of a test of 968 sq. ft. of main Ric-Wil covered. With a steam temperature in the main of 235° F., the net B.T.U. loss per hour due to main in conduit was found to be 45,987, or 0.251 B.T.U. per square foot per hour per degree difference. On this basis the thermal efficiency of the conduit was 90.4%.

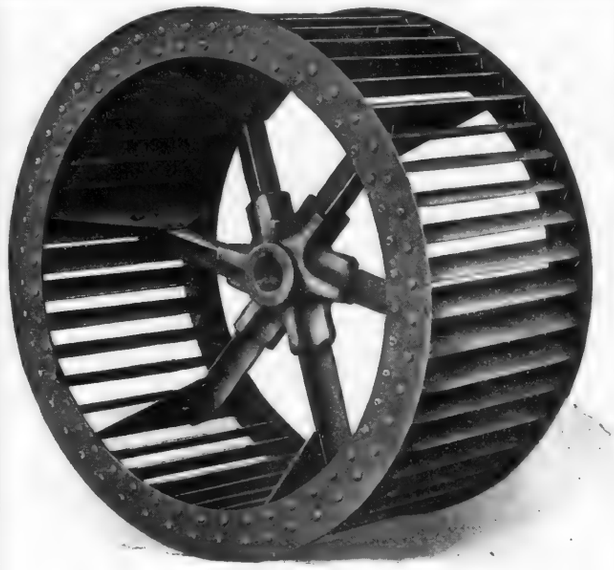


THE PORBECK UNIT HEATER with a low first cost and a low cost of operation.

Adaptability to all conditions and economy are its outstanding features.

May we send you descriptive matter on the Porbeck Unit Heater?

Porbeck Manufacturing Company
1000 North Market Street
St. Louis, Mo.

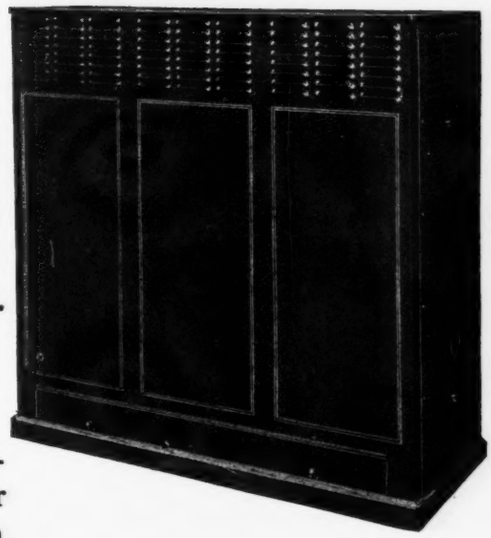


By appearance and satisfactory performance have Massachusetts Squirrel Cage Fans merited their continued use in buildings of all classes.

MASSACHUSETTS BLOWER CO.
WATERTOWN, MASS.
Branch Offices in Principal Cities

Heatovent
(REG · U·S·PAT · OFF·)

BUILD YOUR REPUTATION ON THIS—



Progressive Heating and Ventilating Engineers are making attractive business for themselves and building an enviable reputation by installing the Heatovent in buildings that have never been provided with any means for ventilation.

In almost every community there is an old unventilated school building; too good to be wrecked but a drag on the school system, and a menace to the health of the children.

Install the Heatovent and the old school has the best there is in modern ventilation. When the new school is built, the Heatovent Cabinets can be removed and installed in the new school at very little expense.

Write our nearest branch office if you wish the co-operation of our district engineer in your territory.

BUCKEYE BLOWER CO.

437 West Town Street
COLUMBUS, OHIO.

DIRECT FACTORY BRANCHES

Buckeye Blower Company
1400 Broadway,
New York, N. Y.

Buckeye Blower Company
503 Wabash Building,
Pittsburg, Pa.

Buckeye Blower Company
324 Monadnock Block,
Chicago, Ill.

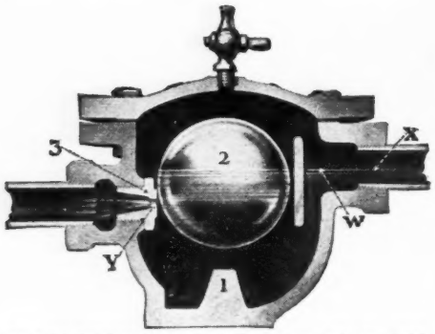
Buckeye Blower Company
372 Whitehall Street,
Atlanta, Ga.

Case & Morse
1018 Fourth Auenue, South
Seattle, Washington

FACTS ABOUT FUEL is the title of a well-arranged folder issued by the Uehling Instrument Co., Paterson, N. J., and devoted to the various types of Uehling CO_2 recorders and combined barometer and vacuum recorders for low-pressure turbine and condensing plants. Special attention is directed in the folder to the feature of combining one recorder for the engineer's office with an auxiliary CO_2 indicator for the boiler front to guide the fireman.

New Design of Johns-Manville Steam Trap.

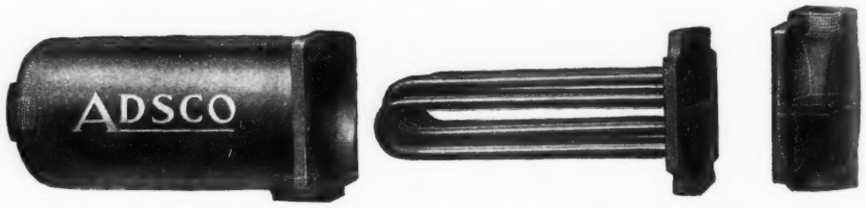
An idea of the latest design of the Johns-Manville steam trap, as described in



CROSS-SECTIONAL VIEW OF TRAP DISCHARGING.

newly-issued circular matter issued by Johns-Manville, Inc., may be seen from the accompanying illustration. As will be noted, the most striking feature of the trap is its simplicity, a hollow, seamless ball taking the place of lever, bucket, thermostat and counterpin. The trap is made in five sizes with capacities, in pounds of water per hour, ranging from 700 to 6,000 lbs. The same principle is applied to the Johns-Manville Junior steam trap for steam pressures up to 100 lbs., with ½-in. inlet and outlet pipe connections, and to the Johns-Manville radiator trap, for steam pressures up to 10 lbs.

ADSCO WATER HEATERS, for use with live steam, exhaust steam, vapor or hot water, as recently brought to the attention of the trade in a bulletin issued by the American District Steam Co., No. Tonawanda, N. Y., are shown in the accompanying illustrations. As stated in the bulletin, the heater is designed to be easily attached to any steam or vapor heating plant, either above or below the water-line. The heating element consists of ½-in. B. & S. gauge copper U-tubes, containing 2 sq. ft. of surface, expanded into a header. The capacity when installed with connection below the water-line of a steam or vapor boiler is 60 gal. per hour; when connected with live steam as the heating medium, 100 gal. per hour.

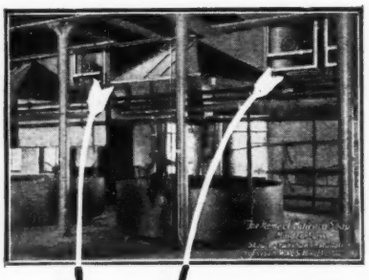


CONSTRUCTION OF ADSCO WATER HEATER.

UNIFLOW IMPROVED RETURN-TUBULAR BOILERS, manufactured by the Lebanon Boiler Works, Harrison Building, Philadelphia, Pa., are brought to the attention of the trade in a handy catalogue. These boilers are featured as assuring positive circulation through the provision made in the arrangement of the tubes for the downflow of water. They are designed to operate efficiently up to at least 150% of rating. Size 3½ x 6¼-in. Pp. 24.

THE BANK BEHIND THE DOOR is the way the Excelso Specialty Works, Inc., Buffalo, N. Y., characterizes the service rendered by the Excelso water heater, the statement being made that the money paid for coal for operating a heating system can return a more handsome interest than that invested in a savings bank. Typical installations of the Excelso heater are shown in connection with a steam or vapor system, warm-air furnace, and water heat-

Save 40% of your power



—and a lot of valuable space as this company did with the—

WING-SCRUPLEX
REG. U.S. PAT. OFF.
EXHAUSTER

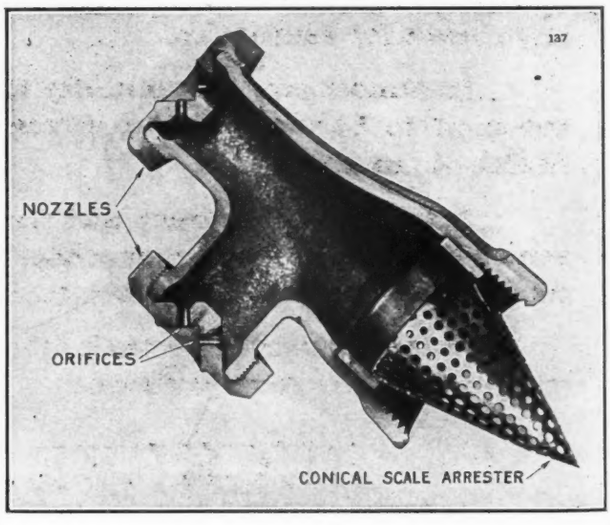
This is the result achieved by using seven Wing-Scruplex Exhausters instead of one large exhauster of another type, for exhausting fumes from seven vats. Like individual motor control—localized ventilation is cheapest and best in the long run

We have the facts. Write for them.

MOTOR ENTIRELY OUTSIDE THE CURRENT OF VAPOR OR AIR, HANDLED BY THE FAN — KEEPS CLEAN AND COOL
BEARING IS FLOODED CONSTANTLY WITH FRESH CLEAN AIR - AIR HANDLED DOES NOT COME IN CONTACT WITH BEARING
AIR OUTLET
AIR INLET

Made with inlet Top-Bottom-Left Side or Right Side

L. J. WING MFG. CO.
Hudson & 13th St.,
New York City



THE IMPACT AIR WASHER

The cut indicates a longitudinal section through a spray head, showing the two impact nozzles with their smooth, round orifices, entirely devoid of obstructing vanes or spiral passages. The conical scale arrester, with its numerous holes, each smaller than the nozzle orifice, intercepts and retains all dirt and scale large enough to plug the nozzles. During this slow accumulation the nozzles spray at full capacity.

Ask for Booklet K.

THE COOLING TOWER CO., Inc.
15 John Street, New York

This theatre

was very beautiful—and it was a good show but the crowd walked on by

ONE THING HAD BEEN NEGLECTED IN THE THEATRE'S CONSTRUCTION—AND THE DIFFERENCE BETWEEN A SUCCESS AND A FAILURE WAS IN THAT ONE LITTLE THING—GOOD VENTILATION.

Where people are gathered together in large numbers there must be plenty of fresh air.

But mere volume is not all. There must be uniform distribution, and no drafts.

The KNOWLES FRESH AIR DIFFUSERS, placed inconspicuously under the seats, bring to each person the quantity of fresh air required by the laws of nature and the Board of Health.

The KNOWLES FRESH AIR DIFFUSERS are a small and inexpensive part of a proper ventilating system, but they are the necessary and finishing touch that make such a system perfect.

Beauty of design and of decoration in the theatre will go for nothing if this one little thing is neglected. An audience today demands proper ventilation.

Booklet, blueprints and prices on request.

"The Camelback Air Diffuser"

KNOWLES MUSHROOM VENTILATOR COMPANY
202 Franklin St. New York City.

"The Notch Type Mushroom"

ing system. In the two latter cases the heater, of special design, is located directly in the fire-pot. The heaters are made in various sizes from a 30-gal. up to an 800-gal. range boiler.

VALVE WORLD for May, 1923, the monthly periodical of Crane Co., Chicago, Ill., contains, as usual the Crane Business Survey supplement and the statement is made that as the telegraphic reports are practically a repetition of those of the previous month, the reports from the various centers are omitted. One of the interesting articles in the May issue is devoted to the proposed enlargement of the Commonwealth Edison plants in Chicago.

ECONOMY SUMP PUMPS AND SEWAGE EJECTORS, including automatic electric cellar drainers, bilge or sump pumps, and sewage ejectors, are presented in a new bulletin (Folder No. 400) issued by the Economy Pumping Machinery Co., 122-124 North Curtis St., Chicago, Ill. Full details are included of each type, special attention being directed to a typical installation of a submerged ejector. Both the submergible and dry pump chamber sewage ejectors, it is stated, are made in various sizes, with capacities ranging from 75 gal. to 5000 gal. per minute. Illustrated descriptions and data are also given of blow-off, gravel-catch and drainage basins which the company furnishes.

WANTED

FOR SALE.—The rights for United States or part of same for patent No. 1,428,187, advanced system of heating by hot air, are for sale. Apply for further information to Sheridan, care of Heating and Ventilating Magazine.

FOR SALE—One 125-H. P. smokeless return-tubular boiler, and one 60 H. P. return-tubular boiler. Address C. M. Neeld 1419 Oliver Building, Pittsburgh, Pa.

BUSINESS OPPORTUNITY—For heating and ventilating engineer or sales engineer who wants established business in the west. Field with practically no competition. First-class agencies, reputation and connections. A big future for an engineer. Address Box 96, care of Heating and Ventilating Magazine.

WANTED—For the Pacific Coast, heating and ventilating contractor contractors' supplies, including a fan. All on commission basis by a salesman well-known to the trade and capable of superintending installation. Address Box 101, care of Heating and Ventilating Magazine.

AGENTS WANTED—Agents or representatives wanted for U. S. A. and Canada for Lumbys Limited, Greetland Boiler Works, Halifax, England. Established 1858. Oldest and largest firm in the trade. Makers of wrought-iron boilers for domestic hot water and central heating. Catalogs free.

SALES ENGINEER—If you are looking for a capable sales engineer who has an established clientele in Ohio, to represent your firm or manage a branch office, kindly address Box 17, care of Heating and Ventilating Magazine.

WANTED—One 8-in. or 10-in. Saunders pipe machine, with two-phase A. C. motor attached. Address E. G. Woolfolk & Co., 15 West 38th St., New York

FOR SALE, NEW—450 O. E. ¾-in. packless modulating radiator valves. 450 O. E. ½-in. radiator ball check traps. Price $2.50 per set in lots of two dozen or more. Check or money order must accompany your order. The National Supply Co., Heating Department, Toledo, O.

POSITION WANTED—Heating engineer, Norwegian, 31, now employed in England, desires position with consulting engineer or contractor. All references. Write Box 71, care of Heating and Ventilating Magazine.

ENGINEER WANTED—Heating and ventilating engineer wanted as manager of heating and sprinkler department near Boston. Experience in mechanical equipment of industrial plants, estimating and shop management. Applicant must have A-1 references. Address Box 44, care of HEATING AND VENTILATING MAGAZINE.

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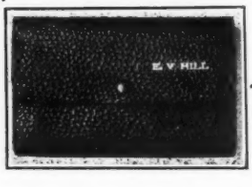
Our trademark means PRECISION, DEPENDABILITY, UTILITY

Get in the Habit of Using TELTRU Instruments

The PSYCHROBOOK

Has been improved. Made only of genuine pigskin. Black or tan. The price is the same.

$7.50



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Psychrobooks
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Aerologists

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